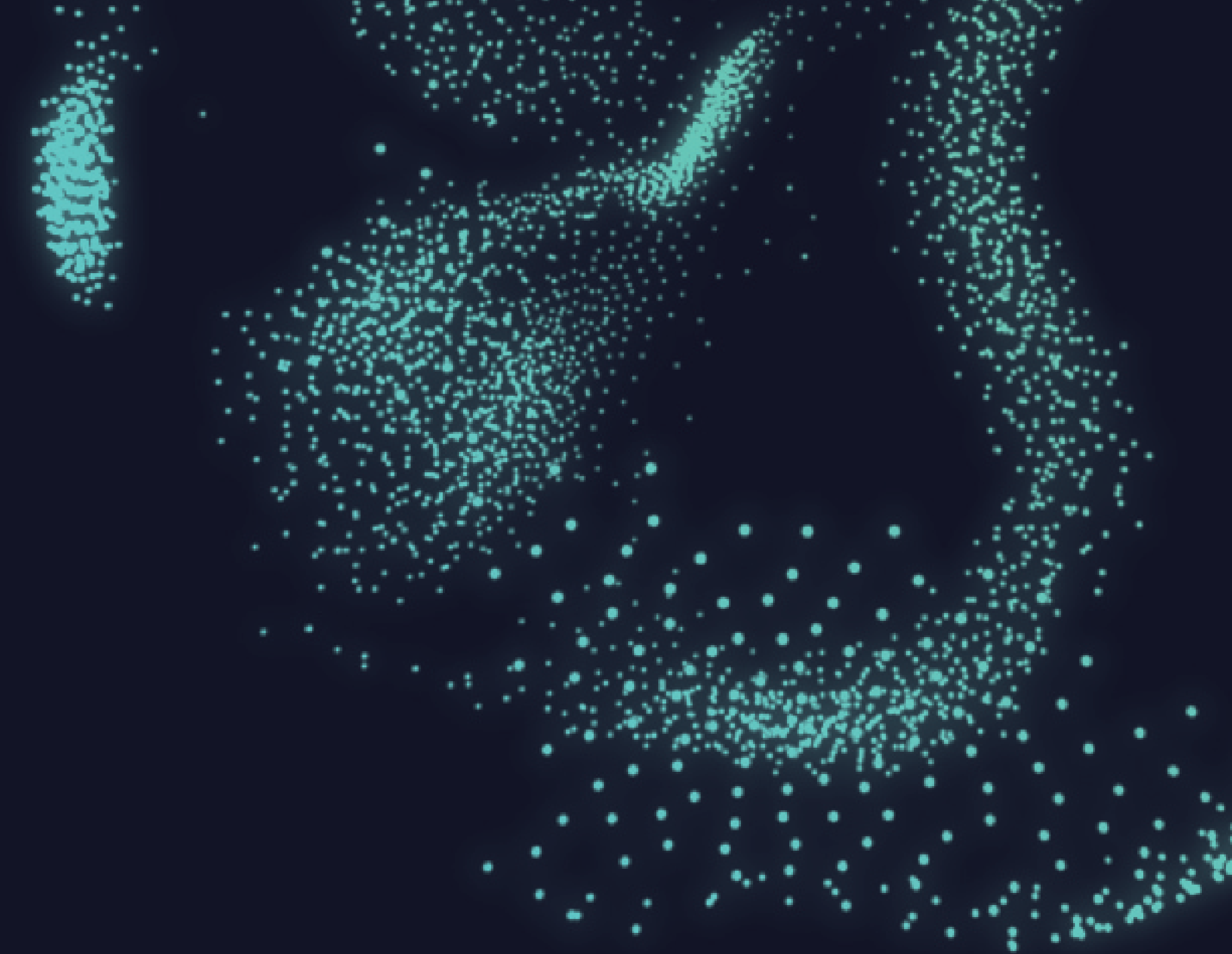

SIEMENS DIGITAL INDUSTRIES SOFTWARE

Simcenter STAR-CCM+ 2510

Release Notes

SIEMENS

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Contents

Simcenter STAR-CCM+ Release Notes 2510

This document provides important information about Simcenter STAR-CCM+ 2510.

Contents:

New Features and Enhancements in Simcenter STAR-CCM+ 2510

Enhancements to Simcenter STAR-CCM+ 2510 are presented by category:

Contents:

Simcenter X

- **For an overview of the new Simcenter X features and enhancements, see [What's New in Simcenter X](#)**

Platform

Contents:

Deployment

- **Operating System (OS) updates**
    - Added Operating System versions
        - Certified on Linux: RHEL 9.6/10.0, Alma 9.6/10.0, Rocky9.6/10.0, SLES 15.7
        - Certified on Windows: Windows Server 2025
    - Retired Operating System versions
        - Retired on Linux: RHEL 8.6/8.8, Alma 8.6/8.8, Rocky8.6/8.8, SLES 15.5, Open SUSE Leap15.5
    - Scheduled Operating System support changes for Simcenter STAR-CCM+ 2602
        - To be retired on Linux: RHEL 9.0/9.2, Alma 9.0/9.2, Rocky 9.0/9.2,SLES 15.6, Open SUSE Leap 15.6
        - To be certified on Linux: SLES 16.0, Open SUSE Leap 16.0

        - To be retired on Windows: Windows 10 22H2, Windows 1122H2

Runtime

- **Easier cluster submission**
    - Effortlessly generate scripts for easier and quicker cluster submission
        - Automatic job launching script generation through guided questions
        - For both single simulations and Design Manager projects
        - Various schedulers supported (SLURM, LSF, Torque, GridEngine, PBS Professional / OpenPBS...)
        - Modify generated script as needed, to accommodate special needs

High-Performance Computing

- **Algorithmic improvement of Random Injector on GPU (DEM)**
    - Faster generation of densely packed particles with GPU-native Maximal Independent Set algorithm of Random Injector
        - No changes in User Interface
        - Highest speedup is observed with increased number of parcels to be injected in dense packing state
- **GPU-native Table(T) and Cp(T) material properties methods**
    - Faster turnaround times for advanced flow and Conjugate Heat Transfer (CHT) simulations with GPU-native temperature dependent material property methods
        - CPU-equivalent solutions ensured by maintaining a unified code base
- **GPU-native Polynomial Density material property method**
    - Faster turnaround time for advanced flow and Conjugate Heat Transfer (CHT) simulations with GPU-native Polynomial Density material property method
        - CPU-equivalent solutions ensured by maintaining a unified code base
- **GPU-native Spherical Harmonics/P1 radiation solver**
    - Faster turnaround times for advanced radiation analyses via GPU-native Spherical Harmonics (P1) radiation solver
        - CPU-equivalent solutions ensured by maintaining a unified code base
- **Boundary Integral Method performance optimization (SPH)**
    - Speed up your simulation time with performance optimization in the Boundary Integral Method
        - Reduction of the number of subdivisions over wall surface elements
        - Performance enhancement for both CPUs and GPUs
- **Compatibility of derived parts with GPU acceleration (SPH)**
    - Faster turnaround time with GPU acceleration for derived parts
        - Compatibility with point probes, constrained plane section, arbitrary sections, and iso surface
        - Up to 4.7 times faster in simulation time with scenes opened
        - Up to 2 times faster in simulation time with scenes hidden
- **GPU-accelerated Virtual Disk**
    - Fast simulation of mesh motion scenarios with GPU-accelerated Virtual Disk method
        - Improved time-to-solution for critical design decisions
        - Faster execution of multiple simulation variants

        - More efficient design space exploration studies
        - Improved performance for sensitivity analyses
- **Improved performance with AMD MI300 GPUs**
    - Faster solutions with AMD MI300 series GPUs
        - Significant performance improvement from 2506 to 2510
        - Memory increase observed on MI300A GPUs
- **Message Passing Interface (MPI) updates**
    - Scheduled Message Passing Interface (MPI) changes for Simcenter STAR-CCM+ 2602
        - To be retired on Linux: Open MPI 4.0.3
- **Reduced memory footprint on AMD Ryzen AI Max+ Proseries (former Strix Halo) with Radeon 8000 series GPUs**
    - Up to 30% memory saving through unified memory allocation, depending on model
- **Memory savings on Windows with MPI-3 shared memory for MS MPI**
    - Up to 18%, depending on model

Geometry and Meshing

Contents:

CAD Interoperability

- **CAD Import version updates**

Siemens CAD Reader	Supported Versions
NX	**Up to NX2506**
Solid Edge	Up to 2025 (Windows)
CATIA V5	**Up to V5-6R2024 SP4**
CATIA V6/3DExperience	Up to R2025x
Creo- Pro/E	Up to Creo 11.0
SolidWorks	Up to 2025
Rhino	Up to 7
JT	**Up to 10.7.1**
Inventor	Up to 2025

CAD Clients	Supported Versions
Client for NX (Linux and Windows)	**NX2212** to NX 2506

CAD Clients	Supported Versions
Client for CATIA V5	CATIA V5-R2020 (R30) to **V5-R2025 (R35)**
Client for Creo	Creo Parametric 7.0 to **Creo 12.0**
Client for Inventor	Inventor 2019 to 2023 Fully dropped next release

- **Metadata import through Simcenter STAR-CCM+ Client for CATIA**
  - Improved workflow by automating metadata transfer between CATIA and Simcenter STAR-CCM+
    - Import metadata for any level:
      - Face
      - Body
      - Part/Component/Assembly
    - Filter to import only what is needed

3D-CAD

- **Reference axis from revolved entity extended to meshed/faceted geometry**
  - Quickly create reference axes from mesh geometry without needing the original CAD model
    - Saves time by enabling direct work on scanned or faceted parts
    - Detects revolved characteristics from selected mesh faces and computes the corresponding axis of revolution
    - Eliminates need for original CAD geometry
    - Works directly with mesh data
    - Provides visual preview functionality
- **Convert revolved and planar meshed faces into Brep sheet bodies**
  - Accelerate design workflows by converting revolved and planar meshed faces into precise BRep sheet bodies
    - Creates precise geometric representations from mesh data
    - Enables downstream CAD operations without original geometry
    - Reduces dependency on source CAD files
    - Streamlines reverse engineering workflows
- **Facet body geometry modification tools**
  - Speed up facet body editing by using familiar BRep tools
    - Surface extension is enhanced to support facet bodies
    - Merge Edges & Faces is enhanced to support facet bodies
- **Auto-match faces in model reimport**
  - Accelerated model reimport by automatically matching non-matching faces.
    - Analyzes face geometry using preset matching rules
    - Manual hints improve algorithm performance for future runs
- **Organization of Design Parameters**
  - Improved Design Parameter organization in complex studies through grouping functionality.
    - Ability to organize Design Parameters into custom or predefined groups
    - Supports standard operations via right-click menu
- **Show only unique bodies**

  - Improved CAD model visualization by filtering duplicate instanced bodies
    - Display only unique geometry
    - Includes all flat bodies plus one representative per instance set
    - Reduces visual clutter and improves performance

- **Faster contact finding in contact browser**
  - Improved performance when searching for contact face-pairs by adding discrete geometry search option
    - Provides CAD vs discrete geometry search options
    - Discrete geometry method offers 30-100x faster search times
    - Configurable angle limits and area overlap thresholds
    - Optional face area computation control

- **Discrete-geometry-based face proximity checker**
  - Improve performance for proximity searches in large assemblies
    - Discrete geometry method for computing face proximities 30 to 100x faster proximity searches compared to CAD mode
    - Makes proximity searches practical for large assemblies
    - Configurable parameters to balance speed vs accuracy
- **Pattern instance skipping in Linear and Circular Pattern features**
  - Faster and easier way to skip instance in pattern features
    - Visual checkbox interface mirrors actual pattern layout
    - Real-time preview

- **Option to synchronize geometry only or synchronize all data**
  - More flexibility in updating Parts that are linked to 3D-CAD
    - Provides granular control over part update operations with three distinct synchronization options for different needs
    - Update: preserves existing parts and updates geometry only, without deleting objects
    - Synchronize Geometry: one-to-one geometry sync while preserving user-modified metadata/tags
    - Synchronize All: complete sync of geometry, metadata, and tags from 3D-CAD baseline
- **Ability to abort feature preview for “Optimize Edges" feature**
- **Ability to control hidden geometry import through new 3D-CAD import dialog option**
- **Enhanced input validation performs basic scalar/vector/coordinate validation on client-side**
  - Moved advanced validation to server-side with improved error messaging
- **Sewing tolerance option available for STEP format during Parts import with user-defined tolerance values**
- **Enhanced import flexibility by exposing tessellation import option for IGES, STEP, CATIA V4, and IFC files directly into Parts**

Parts and Meshing Pipeline

- **Coordinate System Creator operation**
  - Further accelerate surface preparation via pipelineable coordinate system creation
    - Enables automation via simulation operations or templates

        - Saves time from using a combination of operations and reports
        - Creates a coordinate system with origin at the centroid of input part/part surfaces
        - 3 creation modes:
            - Single coordinate system
            - One coordinate system per-part
            - Once coordinate system per-part surface
        - 2 methods to label axes
            - Axis aligned
            - Rotational symmetry
- **Multi-target Boolean subtract**
    - Speeds up part modification by allowing multiple targets in one Boolean subtract operation
        - Enables subtracting tool parts from multiple targets at once
        - Creates one output part for each target part
        - Target parts are processed independently (no interaction between them)
        - Tool parts are automatically defined as all non-target input parts
- **Parametric Surface Morpher – support for rotation**
    - Investigate different designs faster with new “Rotate” Displacement Method in Morph Surface Mesh operation
        - Supports rotation in any defined local coordinate system
        - Rotation Angle supports parameter definition
- **Subtract operation performance enhancements**
    - Faster execution of discrete Subtract Boolean operation
        - Up to 2.7x faster
            - Improved scalability with increasing processor count
            - Time savings depend on the size of geometries involved
        - Less than 1% difference in the resulting face count for a range of cases
        - CAD Boolean operation execution time is unaffected
- **Discrete Imprint operation performance enhancements**
    - Faster execution of discrete Imprint operation
        - Up to 2x faster
            - Time savings are case dependent
        - Improvements for both conformal and non-conformal execution modes
        - CAD mode execution time is unaffected

Surface and Volume Meshing

- **Parallel Surface Wrapper - Phase 2**
    - Further performance improvement in distributed memory (MPI) Surface Wrapper
        - Up to 82% reduction for MPI Surface Wrapper vs Legacy (32 cores)
        - Up to 49% reduction in wrapping time vs MPI Surface Wrapper Phase 1 (32 cores)
        - Consistent results between 2506 and 2510 versions
            - Final surface triangles difference below 1% for a range of cases
- **Performance enhancements in polyhedral volume mesher**
    - Faster polyhedral volume meshing at high core counts

        - Up to 60% reduction in volume meshing time
            - Speedup dependent on the case and number of processors used
        - Speedups are applicable only for polyhedral meshes with quad-dominant surface meshes
        - Volume mesh count and mesh quality metrics are unaffected
- **Multiple sources to multiple targets swept meshing**
    - Mesh more complex sweepable geometries through multiple sources and targets sweeping
        - Swept meshing for multiple unconnected source and target surfaces
        - Requires fewer directed mesh operations
        - Conformal meshing for single and multi-part topologies

Interoperability

- **Teamcenter Integration Supported Versions**
    - Multi-Version Support
        - From 2506, Teamcenter and Simcenter STAR-CCM+ are compatible across ranges of versions
        - Asynchronous upgrades of either Teamcenter or Simcenter STAR-CCM+ are compatible within a range of releases

SimcenterSTAR-CCM+	**Teamcenter**				
	2406	2412	**2506**	2512	2606
2410	Certified				
2502		Certified			
2506			Certified	Scheduled	Scheduled
2510			Certified	Scheduled	Scheduled
2602			Scheduled	Scheduled	Scheduled

- **FMU – Implicit coupling**
    - Successfully model highly dynamic coupled systems with implicit coupling
        - Improved accuracy of transient simulations
        - Improved convergence and stability of dynamic systems
- **Co-simulation mutual termination handling**
    - Save HPC resources by sending and receiving simulation termination notice from coupled application
        - Stop Simcenter STAR-CCM+ simulation when a coupled application signals termination
        - Synchronized stop of co-simulation FMU
        - Facilitates smooth subsequent restart
- **CAE Interoperability Supported Versions**

Integration	**Versions**
CGNS Format	**4.5.0** (Added this release)
Co-simulation API	V8

Functional Mockup Interface (FMI)	2.0, 3.0
Gamma Technologies GT-SUITE	2022, 2023, 2024
Simulia Abaqus	2022, 2023, 2024
Simcenter Nastran	2306, 2312, 2406

Physics

Contents:

Fluid Flow

- **Improvements to coupled flow solver for natural convection flows**
  - Speed up convergence of the coupled flow and energy solver for natural convection flows by enhancing the preconditioning reference velocity to account for gravity body forces
    - Effective only if Gravity model is enabled
    - Example of applications are vehicle thermal soak and fluids thermal stratification
- **Icon indicating if materials and respective properties are sourced from the database or are defaults**
  - Improved traceability and readability of materials sourced from material databases via a new icon indicating whether a property originates from the database
    - For materials selected from a material database:
      - The legacy material icons (e.g., the cloud for gases) and the molecule icon indicate that the given material property is found in the material database and correctly assigned at the Physics Continuum level
      - If one or more properties are not found, default values areassigned, and a yellow warning icon is overlayed on both the material and respective property icons
- **Removal of the deprecated Anisotropic properties**
  - Starting 2510, the Anisotropic (Deprecated) property methods have been removed
    - As replacement the regular Anisotropic property method (introduced in 2210) can be used
- **IAPWS-IF97 compatibility with non-reflecting conditions**

    - The IAPWS-IF97 (Steam) Equation of State is now compatible with the non-reflecting conditions at outlet boundaries and explicit mixing plane interfaces

Adjoint

- **Dynamic penalty update for topology optimization**
    - Enhance overall usability of adjoint topology optimization with the dynamic penalty update algorithm
        - Achieve fast and stable optimization in constraint-heavy problems by dynamically adjusting penalties
        - Ensure smooth convergence without overshoots in objectives and constraints that could compromise stability
        - Eliminate the need for tedious and time-consuming manual adjustments of constraints penalty
- **Support symmetry and periodic boundary conditions for the filtered surface sensitivity**
    - Correctly leverage symmetry planes and periodic interfaces with enhanced boundary conditions for computing filtered surface sensitivity
        - Ensure continuity in sensitivity fields at shared edges
        - Maintain symmetric sensitivity fields for precise results
        - Prevent the formation of pierced faces after mesh deformation with accurate sensitivities calculations at symmetry and periodic boundaries

Heat Transfer

- **Thermal comfort models compatible with time-scales and unsteady solvers**
    - Enabling fully integrated transient thermal comfort studies through the compatibility of thermoregulation and comfort index models with unsteady analyses
        - Fiala thermoregulation model, the Equivalent HomogeneousTemperature (EHT) models as well as the Berkeley models are compatible with
            - Unsteady segregated and coupled solvers
            - Multi-time scales analyses

- **Improved memory management during View Factor compute**
    - Lower memory usage during view factor computation upon initialization thanks to algorithmic improvements
        - Overall memory savings for large Vehicle Thermal Management (VTM) cases (i.e., larger than 150 M cells) in the order of 3 – 5 %

- **Improved robustness of radiation patching**
    - Enhanced stability of the radiation patch calculation solver via algorithmic improvements

Eulerian Multiphase

- **Generalized Phase Replacement model**
    - Remove undesired flow features or those with little or no engineering value with Generalized Phase Replacement

        - Pragmatic approach that avoids having to refine further in areas of no interest to remove issues
        - Generalization of previous method used to stop numerical ventilation in marine cases, now widely applicable
        - Non-physical model to exchange one phase for another in certain locations or based on user-defined criteria
            - Field function used for transition criteria
            - Either primary or secondary phase may be replaced depending on the sign of the field function **(new)**
            - Compatible with MMP as well as VOF **(new)**

- **Surface Tension: User-Defined Contact Angle compatibility with Hysteresis**
    - Include accurate droplet pinning effects in a wider range of applications with hysteresis and user-defined contact angle modeling
        - Contact angle hysteresis keeps droplets pinned when forces are below the net contact line force
        - Previously, hysteresis only worked with built-in models like Kistler
        - Custom contact angle models can now be implemented alongside hysteresis and pinning effects
        - Useful for applications such as vehicle water management
- **Eulerian Multi-Phase (EMP): Lift correction model**
    - Drag Correlated has been removed as one of the options for lift correction
- **A-MUSIG and S-Gamma population balance models**
    - Coalescence models renamed as coagulation models for particulate flows

Lagrangian Multiphase

- **Particle Rotation model for solid particles**
    - Improved accuracy of simulating solid particle flows with the Particle Rotation model
        - Enabled new models
            - Drag Torque
            - User-Defined Drag Torque
            - Spin Lift Force
        - Boundary rebound mode accounts for rotation
        - Typical applications
            - Sand ingestion in turbines and engines
            - Vehicle, vessel, equipment soiling
            - Cold spraying in additive manufacturing
- **Wall-bound droplets coalescence model**
    - Improved accuracy of water management simulations by resolving the droplet coalescence for wall-bound phases
        - The collision model is available for wall-bound phases
        - Only the coalescence outcome in the collision map
- **Random Injection option in Surface Injector for massless particles** Community Idea

- Improved accuracy of post-processing fluid flow simulation results with the Random Injection option for massless particles
  - Better control over the number of injected parcels and distribution of injection points

- **Track Point Inclusion Fraction option in Track File setup [D4413]**
  - Improved speed, maintenance, storage, and sharing of the project files with the option to reduce the size of track files
    - Track Point Inclusion Fraction solver option
    - Limits the number of parcels stored in the track file
    - User-specified fraction of parcels is stored
- **Diameter Ratio Limit option in Impingement Heat Transfer model**
  - Improved accuracy of heat transfer between droplets and boundaries of the solid region with the Diameter Ratio Limit option
    - Based on research by N. Wruck, 1998
    - Main application: Selective Catalytic Reduction (SCR)
- **Improved speed for wall-bound phase solution**
  - Speedup of the simulations with Lagrangian wall-bound phases through algorithmic improvements
    - No changes in User Interface
    - Relevant only for setups utilizing the drag model
    - Highest speedup is observed with
      - Increased number of wall-bound parcels
      - Higher number of parcels per cell

Discrete Element Method (DEM)

- **Template phase interactions [D4924]**
  - Faster and less error-prone input of DEM multiphase interactions with the Template Phase Interaction option
    - User-set templates for contact models are applied to multiple interaction pairs
    - Any number of default interaction settings can be created, each associated with a different set of interaction pairs
- **DEM compatibility with Fluid Film**
  - Simulate complex multiphase systems involving coexisting liquid films and arbitrary shape particles with DEM and Fluid Film now compatible
    - DEM particle Rebound Mode for shell interfaces
    - Applications
      - Battery runaway: smaller LMP particles impinging boundaries, forming a fluid film, and larger DEM particles accumulating on the same boundaries
      - Soiling of vehicles: liquid and solid particles depositing on the surface, with liquid particles forming a fluid film
      - Tablet coating: coating liquid modeled with Lagrangian droplets impinging on a fluid film and DEM tablets interacting with the fluid film
- **User-Defined Flexible Fiber model [Community Idea 1], [Community Idea 2]**
  - High-fidelity fiber representation with User-Defined Flexible Fiber model
    - Initial shape of fiber defined manually or through table

        - Fiber segments of different dimensions allowed

Reacting Flows

- **Complex Chemistry Turbulent Flame speed closure performance improvements**
    - Reduced turnaround time when using the Complex ChemistryTurbulent Flame speed Closure (CC-TFC) model due to algorithmic improvements to the chemistry solver
        - Performance benefits most pronounced for larger reaction mechanisms

Case	**Number Species/Reactions**	**Solution time speed up (vs 2506)**
APC6 OP5	56 species / 160 reactions	25%
Industrial ICE case A	54 species / 320 reactions	12%
Industrial H2 engine	9 species / 21 reactions	8%
Industrial ICE case B	145 species / 696 reactions	45%

- **Herweg-Maly Turbulent Flame Speed (TFS) correlation**
    - Easy application of Damköhler number-based TFS correlation with the addition of Herweg-Maly method
        - New selectable method alongside Zimont and Peters approaches
        - Previously required implementation via cumbersome field function
        - Useful for In-Cylinder applications, in particular H2 combustion
- **User-Defined Efficiency Factor for Thickened Flame Model (TFM)**
    - Greater flexibility in Thickened Flame Model (TFM) Efficiency Factor method with introduction of User Defined approach
        - Allows for novel Efficiency Factors, for example to add customization for H2 combustion thermo-diffusive instabilities
        - Additional Efficiency Factor multiplier added, which can be used to easily scale pre-existing methods
- **Soot time step sub-cycling**
    - More accurate and smooth evolution of soot with the introduction of soot time step sub-cycling
    - Less sensitivity to time step size for soot evaluation
    - Automatically applied to Soot Sectional Method and Method of Moments approach
- **Acoustic Modal Analysis: compatibility with Mixture Multiphase (MMP)**
    - Wider range of applications that can leverage acoustic modal analysis by unlocking compatibility with MMP model
- **Minimum flame brush thickness for Specified Burn Rate Table Method**
    - Improved robustness with ability to set a minimum flame thickness
    - Allows for smoother specified burn rate progress variable
    - Previously only available with Wiebe Function method

Electrochemistry

- **Adaptive Mesh Refinement compatibility with Electrodynamic Potential and Electro-Deposition Coating**
  - Faster time to solution for simulations leveraging electrodynamic potential (EDP) with Adaptive Mesh Refinement (AMR) compatibility
    - Efficient use of computational resource by refining mesh only where required
    - Unlocks built-in AMR models for Overset and Free Surface for simulations that require EDP alongside user-defined AMR criteria
    - Example applications include e-coating and plasma arcs
- **3D Cell Design: Cathode Active Material Dissolution aging model**
  - Increased fidelity of cell behaviour with the Active Material Dissolution aging model
    - Captures the impact of a parasitic side reaction that eventually dissolves the metal cathode of batteries
    - Additional aging model introduced to complement existing aging models such as surface crack growth and loss of active material
    - Visualized with new field function "Subgrid Particle Dissolved Mass Fraction of [X]"
- **Tortuosity property for solid porous phases**
  - Provides a more accurate representation of transport coefficients in porous media with individual tortuosity values for fluid and solid phases
  - Allows for implementation of advanced electrochemical transport correlations such as Bruggeman
  - Previously, a single tortuosity value was applied in a mesh cell for all phases

Electromagnetics

- **Finite Element and Higher Order support for Surface and Volume Integral Reports**
  - Easier post-processing workflow and higher accuracy of surface and volume integrals via a native Finite Element capable report
    - No need to employ Subdivision Derived Parts to have the highest accuracy in results analysis
- **Improved workflow for polynomial-order assignment in EMAG studies**
  - Easier discoverability and user-experience during setup preparation of high-order electromagnetics simulations via a revisited layout of the user interface

Structure Mechanics

- **Time-Step Recovery (for structure mechanics only)**
  - Major improvement in robustness and 10x speed-up for simulations with strong non-linearities
    - Particularly effective for sudden events like snap-throughs and buckling
    - No more try-and-error to find correct time-step size, get first run right
    - Enables recovery of diverged or non-converged time-steps with fully automatic time-step size correction
- **Structural Shells: Essentials**
  - Accelerated simulation with accurate modeling of large and thin structures using continuum shells in structural mechanics
    - Superior accuracy for elements with edge-length to thickness ratio > 2, allows larger element sizes

        - Easier model handling – no need to zoom in/out to pick tiny edge surfaces
        - Easy and fast meshing
- **Perzyna Viscoplasticity model**
    - Accurately predict plastic deformation of materials with time-and strain-rate dependent plasticity
        - Enables realistic simulation of stress relaxation and delayed yielding phenomena
        - Enhances the reliability of rapid forming simulations by capturing time- and rate-sensitive effects
- **Contact Force Field Function**
    - Allows accurate post-processing of forces on contact segments
- **Easier visualization of modal displacements**
    - Visualization and animation of eigenmodes with only a few clicks

Finite Element Rheology

- **Motion for contact parts**
    - Greater coverage for manufacturing processes such as extrusion where moving components contact the product
        - Contact parts can move with arbitrary translation and rotational motion
        - Previously motion could only be tangential to the surface
        - Walls can be slip, partial slip or no-slip

Motion, Overset, and Adaptive Mesh Refinement

- **Virtual Body geometry edge capturing improvement**
    - Improved simulation accuracy by maintaining exact locations of sharp corners
        - Enhanced geometry edge capturing for mesh motion analyses with Virtual Body
        - Efficient, low-overhead remeshing and interpolation
- **DFBI Rotational Driver for dynamic motion**
    - Improved modeling of rotating components under dynamic conditions
        - Extension of the DFBI rotational driver to Multi-Body Motion
        - Deactivation during the simulation is supported
        - Allows analysis of time-dependent rotational speed profiles, including linear ramps and S-curve accelerations.
        - High-fidelity analysis of rotational wheel behavior during water wading
        - Enhanced component design optimization through precise capture of transient dynamic effects
        - Applications: rotating wheel in water wading, marine propellers, etc.
- **Virtual Body support for DFBI**
    - Entirely new approach for tackling DFBI applications
    - Good stability for cases with tight gaps, e.g., marine lock simulation
- **Kinematics solver support for ARM**
    - Capability to run simulations on ARM-based clusters

Design Manager

- **Support for Studio Scenes in Design Manager**
  - Improved consistency between simulation and Design Manager scene files
  - Support of photo-realistic rendering
- **Copy and paste data from Design Table to Microsoft Excel**
  - Increase productivity
  - Reduce the likelihood of errors

Data Analysis

- **Solution Histories support for Resampled Volume**
  - Interactively visualize 3D transient data with Resampled Volume support for Solution Histories
    - Store down-sampled volume data
    - Significantly reduce memory footprint, no need to store mesh and solution
    - Easily identify areas of interest after simulation has completed
  - Highly accelerated transient field analysis
    - Dynamically slice through resampled volume with instant field results
    - Quickly process transient data by browsing through pre-recorded time-steps
    - Understand results better with volume rendered animation
- **Multi-Dimensional Table to Field Function interpolation** Community Idea
  - Improved workflow for interpolation of multi-dimensional data with new File Table (Multi-dimensional)
    - Support interpolation from 3D variables
    - Leverage new visualization to analyze slices of dataset
  - Easy interpolations using all 3D dimensions of data with new interpolateTable Operator
    - Easy to understand syntax for new interpolation operation
  - Seamless data exchange with Simcenter Amesim
    - Common file format allows effortless linkage between tools
- **Accelerated Scene updating through parallelization**
  - Open and update Scenes quicker through performance enhancement of data preparation
    - Parallelization of data processing algorithms for rendering process reduces turnaround time
  - Effective resource management for remote rendering
    - Customize rendering thread count for both server-side and ad-hoc services with new user options
- **Export Reports via Tabular Summary to .csv file** Community Idea, D5627
  - Increased data analysis flexibility by exporting Reports into a .csv file
    - Use Tabular Summary object to make reports available for external analysis purposes
    - Automate export process via Simulation Operations Export operation
- **Stages support in Updates for Monitors**
  - Embedded automation capabilities with added stages support
    - Update behavior in Monitors can now be staged
  - Easily construct updating policies when switching from steady to transient
    - Staged triggers can have different settings for each stage

- **Animations in Simcenter Web Viewer**
  - Enhanced comprehension of simulation results through animation support in Simcenter Web Viewer
    - Leverage animations to effectively communicate simulation results
    - Export standard Simcenter STAR-CCM+ animations into Viewer File (.sce)
    - Enrich scene content with streamlines tracers, vector pulses, line integral convolution and solid stress deformations
- **Enhanced user experience for Studio Scene**
  - Higher frame rate for live interaction in Studio Scene
- **Better comprehension and ease of use for rendering control**
  - New option to choose render threads directly from user interface
  - Chosen threads are displayed in command line preview
- **Simcenter STAR-CCM+ Viewer removal notice**
  - Starting 2606, Simcenter STAR-CCM+ Viewer will be removed
    - As replacement a downloadable version of the Simcenter STAR-CCM+ Web Viewer will be made available
    - All features of the Web Viewer with the additional ability to process large files will be available
- **Block-Mapped Coordinate System removal notice**
  - Starting 2606, Block-Mapped Coordinate Systems will be removed
    - Legacy turbomachinery workflows using Block-Mapped Coordinate Systems are no longer supported
    - Use blade parametrization as standard workflow

Industry Solutions

Contents:

Acoustics

- **On-the-Fly Discrete Fourier Transforms**
  - Access results sooner by using On-the-fly Fourier Transforms
    - Identify noise sources on selected volumes and Surfaces more intuitively
    - Save workflow time with a simplified set up
    - Select frequencies of interest before running the simulation and see the noise source distribution on selected volumes
  - Remove need to save large files and access results earlier (compared to current Out of Core FFT calculation)
    - Use same settings as FFT tool

        - Obtain same results as equivalent FFT calculation
- **Lilley Sources model and LEE Sources model removal notice**
    - Starting 2602, two of the Broadband Noise Sources Models will be removed due to very low usage. The models are the following:
        - Lilley Sources model and LEE Sources model
        - Please contact your Simcenter STAR-CCM+ customer support representative for further information

E-Powertrain

- **Pack thermal runaway tool supporting single pseudo-chemical reaction**
    - More precise thermal runaway cell self-heating with the Arrhenius Pseudo Reaction model
        - Arrhenius-based kinetic equation follows same formulation as in [1] and is popular within automotive industry
        - Offers greater predictability in modeling exothermal reactions compared to table approach
        - Supports single reaction in 2510 release
    - Simple and fast setup with dedicated formulation interface
        - Easy input for kinetic equation parameters
        - Automatic model deployment on all cells in pack
    - Customized analysis with 2 dedicated new field functions
        - One for reaction rate and one for concentration of reactants
- **3D Cell Design: Cathode Active Material Dissolution aging model**
    - Increased fidelity of cell behaviour with the Active Material Dissolution aging model
        - Captures the impact of a parasitic side reaction that eventually dissolves the metal cathode of batteries
        - Additional aging model introduced to complement existing aging models such as surface crack growth and loss of active material
        - Visualized with new field function “Subgrid Particle Dissolved Mass Fraction of [X]”
- **e-Machines – Support radial flux machine import through SCDX (Simcenter Data eXchange) file**
    - Enlarged spectrum of e-machine types with radial flux machine support
        - Simcenter STAR-CCM+ e-machine design workflow now supports radial flux machine designs through .scdx file
        - One file containing both e-machine CAD and physics
        - Compatible across all e-machine/EMAG Simcenter tools
        - Ensures numerical continuity across EMAG and CFD teams
- **e-Machines – Streamlined wall condition setup for external air in contact with rotating surfaces**
    - Any stationary external air surfaces in contact with a rotating shaft are marked as “Rotating” allowing Rotation wall condition to be readily applied

[1] *Ren et al. Model-based thermal runaway prediction of lithium-ion batteries from kinetics analysis of cell components*

In-Cylinder

- **Temperature-dependent thermal conductivity by default**

- Enhanced accuracy through temperature-dependent thermal conductivity for gaseous species
  - Addresses the inadequacy of Lewis number equal to unity across combustion types and regimes
  - Aims at Leverages Lennard-Jones coefficients for 31 species, stored in database, in conjunction with the Mathur-Saxena Averaging method
    at maximizing confidence in numerical heat transfer predictions, greatly affected by thermal conductivity of gases
- Reduced likelihood of set-up errors
  - Adds warning, indicating activation of Mathur-Saxena Averaging
  - Is complemented by the direct visual feedback of properties not being sourced from databases

- **Streamlined sector modeling setup for engines with gasket**
  - Enhanced usability in sector modeling by introducing an additional 2D section import option
    - Addresses limitations of previous versions upon importing splines of engine configurations including head gasket
    - Continues to allow for an adjustment of Stroke, as opposed to the existing Head and Piston Bowl (At BDC) option
- **The following two features are added in the context of our planned future support for multi-cylinder capabilities**
  - Multi-cylinder-compatible Engine Parts Creation panel
    - Outputs number of intake and exhaust valves next to the cylinder they are associated with, complemented by a read-only value of the auto-calculated number of plenums
  - Valves as children of associated cylinder
    - Introduces a new Quick Part hierarchy, nesting valves as children of the associate cylinder, and groups boundaries for cylinder, valves, and plenums into a single folder
- **Consistent heat transfer calculation across models**
  - Enforces alignment in derivation of Lower Heating Value, molecular weights and, in turn, heat releases, across all models of the offered suite
- **Complex Chemistry Turbulent Flame speed closure performance improvements**
- **Herweg-Maly Turbulent Flame Speed (TFS) correlation**
  - Details in the Reacting Flows section

Smoothed-Particle Hydrodynamics

- **Particle refinement**
  - Increase locally the flow accuracy through adaptive particles
    - Locally create adaptive particle criteria with block, cylinder or/and sphere refinement shapes
    - Coordinate system available for each shape particle refinement
    - Up to 10 levels of particle refinement
  - Faster turnaround time compared to the entirely refined simulation
    - Refining particles locally saves particle counts compared to the fully refined simulation
- **DFBI Meshfree Multi Body Motion**
  - Increased application coverage through the DFBI Meshfree Multi Body Motion solver
    - Model contact between solid bodies
    - Model motion from SPH fluid forces and moment
    - Use Velocity Driver and/or Rotational Driver

- **Outlet boundary conditions**
    - Enable additional applications with the support of outlet boundary conditions
        - Pressure outlet definition
        - Outlet with mass flow rate definition
        - Velocity inlet with negative velocity definition
- **One-way coupling fluid-structure co-simulation**
    - Analyze mechanical stresses and solid deformation through one-way fluid-structure interactions simulations
        - Model the effect of the fluid on the solid
        - Limited to Simcenter STAR-CCM+ SPH fluid and FEA solid solvers
- **Coordinate system for the SPH constrained plane section derived part**
    - Enable data analysis on moving plane section through the support of coordinate system for SPH constrained plane section
- **Free surface performance optimization**
    - Faster turnaround time with free surface visualization through iso-surface derived part performance optimization
    - Up to 12 times faster in simulation time
- **Region Momentum Source**
    - Increased application coverage with the compatibility of the region momentum source option

Turbomachinery

- **Turbomachinery Import Workflow**
    - Fully integrated workflow from candidate design shapes to figures of merit with the Turbomachinery Import Workflow
        - Integration of the Turbomachinery Aerodynamics Workflow Application Productivity Tool capabilities (TAW APT)
        - Up to 10 times faster in the import and CAD generation compared in serial to TAW APT
        - Compatible with parallel mode
    - Complete end-to-end CFD workflow
        - Import of design based on spline data
        - Automatic CAD generation
        - Standardized meshing and physics model
        - Industry standard reporting
    - Quickly create a fully setup, ready-to-run sim file for turbomachinery performance evaluation
    - Widely leverages process automation capabilities built into Simcenter STAR-CCM+
    - Based on a template .sim file
- **Turbomachinery Mesh – CAD projection**
    - Increased geometry fidelity in the Turbomachinery structured mesh through CAD projection
        - New option Project to CAD activated by default
    - Increased productivity by removing the need to run the Surface Remesher prior to the Turbomachinery Mesh if CAD tolerance is below 1.0E-7
- **IAPWS-IF97 compatibility with non-reflecting boundary conditions**
    - For more information, see Fluid Flow

- **Support periodic Boundary Conditions in the computation of filtered surface sensitivity**
  - Correctly leverage periodic interfaces with enhanced boundary conditions for computing filtered surface sensitivity
  - For more information, see Adjoint

User Guide

- **New Verification Suite Cases**
  - Finite Element Solid Stress
    - Drawing of a Circular Flange with Hill Plasticity
    - Crushing of a Plastic Pipe with Rigid Contact
    - Double Notch Tension Using the Perzyna Viscoplasticity Model
    - Uniaxial Tension Using the Perzyna Viscoplasticity Model
- **New Tutorials**
  - Compressible Flow
    - Turbomachinery Import Workflow: Gas Turbine Aerodynamics
  - Heat Transfer and Radiation
    - Thermal Comfort: Transient Car Cabin Cooling
  - Multiphase Flow
    - Lagrangian: Solar Panel Cleaning
    - Lagrangian: Spray Drying of Milk Droplets
  - Motion
    - SPH and DFBI Kinematic Motion: Planetary Gearbox Lubrication
  - Solid Stress
    - Continuum Shells: Pinched Cylinder
    - Time-Step Recovery: Slit Valve
- **Modified Tutorials**
  - Adjoint Topology Optimization: Flow through a U-Bend – updated to include dynamic penalty update for topology optimization
  - Eulerian: Hibiki's Bubble Column – several adjustments made to numerical parameters
  - Normal Modes Solver: Wind Turbine Blade – replaced vector wap with the modal displacement transform in the animation section; also removed Element Enhancement and Enhanced Hex8 models from the starting file
  - Thermal Comfort: Car Cabin – updated results due to including vasomotion (vasodilation and vasoconstriction) in the Fiala model
  - Liquid Absorption and Transfer: Spray Coating – enhancement to workflow
  - Conjugate Heat Transfer and Thermal Stress: Exhaust Manifold – update to instructions for running the simulation
  - Coarse Grain Particles: Fluidized Bed – updated workflow for phase interaction specification
  - Arbitrarily Shaped Particles: DEM Polyhedra – updated workflow for phase interaction specification
  - In-cylinder tutorials – updated workflows to match latest user interface
  - Higher Order Magnetic Vector Potential: Axial Flux Motor – updated starting file with improved mesh settings
  - FMU Co-Simulation: Temperature Controller – updated starting file with modified expression

Important Notes 2510

This section contains important notes that you must become familiar with before using this latest release of Simcenter STAR-CCM+. If you have questions about any of this information, please contact your Simcenter customer support representative.

Java Upgraded to OpenJDK Version 21.0.6

The Java SDK (Software Development Kit), which is required to compile Java macros, has been upgraded to OpenJDK v21.0.6 in the current release. Simcenter STAR-CCM+ ships with Eclipse Temurin 21.0.6 JDK. JDK builds prior to 21.0.6 do not work, but later versions of JDK 21 are allowed (both OpenJDK-based distributions and Oracle's JDK).

You need NetBeans 12.6 or Eclipse 2021-09 (4.21) or later to work with Java 21.

Planned End of Support for Open MPI 4.0.3 and UCX 1.8.0 (2602)

Support for Open MPI 4.0.3 and UCX 1.8.0 will be removed in Simcenter STAR-CCM+ 2602. More information about both components can be found in "Using Open MPI" and "Using UCX" in the Simcenter STAR-CCM+ User Guide, under Client-Server Setup > Working With Parallel Servers > Supported MPI Implementations.

Pre-Processing: Planned End of Support for JT Open Toolkit (2602)

JT Open Toolkit for surface import has been deprecated since version 2506, and is planned to be retired in version 2602. The recommended practice is to use Siemens Adapter to import JT files.

Tables: Changes to Handling of Interpolation and Differentiation Methods

Simcenter STAR-CCM+ now selects a table interpolation or differentiation option depending on whether the input table has enough data points for the option that you requested.

For example, if you specify Cubic (Akima) but the input table has less than 4 data points (the minimum required for this method), it tries the linear method which requires a minimum of 2 data points in the table. If there is only one data point Simcenter STAR-CCM+ resorts to the step method.

Summaries: Changes to Handling of Plots, Scenes, and Layouts

In the current release of Simcenter STAR-CCM+, summary reports for scene, plot, and layout objects now exclude properties information of these objects' sub-nodes by default. Activating the *Show Properties* option for these summary objects causes their summary report to include the substantial properties information of those sub-nodes.

This new default applies only to newly created summary objects. Settings for summary objects created in previous versions of Simcenter STAR-CCM+ are unaffected when the simulation file is restored.

Meshing

Automation of Core Mesh Optimizer

The Core Mesh Optimizer has been fully automated, and there are no user settings in the UI of the current release.

Simulation files that were saved in previous releases with *Run Legacy Core Mesh Optimizer* activated are restored with the pre-existing settings.

Changes to Reporting of Resource Use

After the execution of each mesher and each mesh operation, text similar to this is printed to the Simcenter STAR-CCM+ *Output* window:

```
Surface Remesher Completed: CPU Time: 0.02, Wall Time: 0.02, Memory: 1338.04
MB
```

This output has changed in two ways in the current release:

- The amount of memory reported is now the resident set size (RSS) instead of the virtual set size (VSS). This reflects more accurately the amount of physical memory that is used. You will likely observe a reported value that is smaller than in previous releases.
- The correct wall time is reported on Windows. Before this change, CPU time was incorrectly reported a second time for the `Wall Time:` label on Windows.

Material Properties

End of Anisotropic Material Property Specification Method

For four material properties—**Thermal Conductivity**, **Electrical Conductivity**, **Permeability**, and **Permittivity**—the **Anisotropic** material property specification method (with 9 components) was deprecated starting in Simcenter STAR-CCM+ 2210 and has been removed from the current release.

As a replacement, a new **Anisotropic** material property specification method (with 6 components) was introduced in version 2210 for **Thermal Conductivity**, **Electrical Conductivity**, **Permeability**, and **Permittivity**.

End of "Anisotropic (Legacy)" Material Property Specification Method for Thermal Conductivity

For the **Thermal Conductivity** material property, the **Anisotropic (Legacy)** material property specification method was deprecated starting in Simcenter STAR-CCM+ 2210 and has been removed from the current release.

As a replacement, a new **Region Scalar Profile** material property specification method was introduced for the **Thermal Conductivity** material property in version 2210. *This new method allows a scalar profile to be specified at the **[Region]** > **Physics Values** level.* This scalar profile has various specification methods such as **Constant**, **Field Function**, **Table (Iteration)**, **Table (r)**, **Table (Time)**, **Table (x,y,z)**, **Table (xyz, time)**, and **User Code**.

Heat Transfer: Change to Thermal Network Interface Affecting Workflow

For heat transfer in the current release, thermal network interfaces have mapped network connectivity instead of connect-average network connectivity.

As a result, when you load a simulation file into the current release with a thermal network interface using connect-average connectivity, you must reinitialize the interface or the solution. Otherwise, any reports, monitors, plots, or scenes on the thermal network interface boundaries would be empty.

Adjoint

Planned Removal of Velocity Component Field Functions (2610)

The scalar field functions that represent residuals of individual velocity components have been deprecated starting in the current release and are planned to be removed in version 2610. These are:

- **Adjoint of <Cost Function> w.r.t. Residual of Velocity-X**
- **Adjoint of <Cost Function> w.r.t. Residual of Velocity-Y**
- **Adjoint of <Cost Function> w.r.t. Residual of Velocity-Z**

A single replacement is already available in the current release, a *vector* field function named **Adjoint of <Cost Function> w.r.t. Residual of Velocity**.

Changes to Topology Optimization Solver Settings

The following properties related to the Topology Optimization Solver have been changed:

- The Optimization Settings *ADAM:Beta 1* and *ADAM:Beta 2* have new default values:
    - For *ADAM:Beta 1*, the default value has been changed from 0.5 to 0.25.
    - For *ADAM:Beta 2*, the default value has been changed from 0.75 to 0.25.
    - *ADAM:Beta 1* and *ADAM:Beta 2* can now take a value of 0.
- The *Verbosity* property was added. When activated, it displays additional optimization data, such as the constraint Lagrangian multiplier, penalty factor, optimization iteration, normalization factor, and more, in the *Output* window during runtime.
- For the **Topology Optimization** > **[Constraint]** > **Volume Ratio Constraint**, the default *Penalty Update* has been changed to `Dynamic`.

Simulation files that were saved in previous releases are restored with the pre-existing update mode, now under `Specified`.

Changes to Related Reports

- The report Lagrange Multiplier was renamed Constraint Lagrange Multiplier.
- The newly added Constraint Penalty Factor report returns the penalty factor that is associated with a topology optimization constraint.

Multiphase

End of Drag Correlated Option for Lift Correction

The *Drag Correlated* option for **Lift Correction** was deprecated starting in Simcenter STAR-CCM+ 2402 and has been removed from the current release.

Pressure Drop Report Not Applicable for Mixtures

The pressure drop report calculates the difference in total pressure. The total pressure is defined as the pressure that is obtained by bringing the fluid to rest isentropically. However, for multiphase mixtures, this definition becomes inapplicable because isentropic deceleration can alter the phase composition. Consequently, total pressure and total temperature are not available for mixtures. Therefore, the Pressure Drop report is not applicable when using mixture equations of state, such as those in Volume of Fluid (VOF), Mixture Multiphase (MMP), and two-phase thermodynamic equilibrium models.

Smoothed Particle Hydrodynamics

Change to Boundary Integral Method

The Smoothed-Particle Hydrodynamics model's property *Boundary Integral Method Subdivision Refinement Degree*, which has been newly exposed in the current release, also has a new default value of 3, which may lead to slight variations in solution results. Previous releases of Simcenter STAR-CCM+ had an internal setting of 5.

Simulations that were saved with this model in previous releases will restore in the current release with 5 as the setting for this property.

Change to Particle Remediation

To make shifting (that is, when the *Shifting Option* of the **Particle Remediation** model is set to `Skillen`) compatible with the **Adaptive Particles** model, the formulation has undergone minor modifications. Therefore the solution results may appear slightly different if shifting is used, even in simulations without particle refinement.

DEM: Renaming of UI Components for Random Injector

Several components in the DEM random injector user interface have been renamed to enhance clarity and prevent misinterpretation of functionality:

- The **Particle Count** method in the **Particle Packing Specification** condition has been renamed to **Parcel Count**.
- The **Number of Particles** node has been renamed to **Number of Parcels**.
- The tooltip for the **Particle Count** node has been changed to `Number of particles per parcel`.
- The **Porosity Limit** method in the **Particle Packing Specification** condition has been renamed to **Volume Fraction Limit**.
- The **Porosity Limit** node has been renamed to **Volume Fraction Limit**.

Solid Stress: Removal of User-Defined Yield Stress

For the J2 Plasticity material law model, `User-defined` yield stress was deprecated starting in Simcenter STAR-CCM+ 2410 and has been removed from the current release.

For new simulations using J2 Plasticity in the current release, the `User-defined` method is replaced by the new `Table (Yield Stress, Plastic Strain)` method.

Electrochemistry: Renaming of Intercalation Particle Objects

Due to refactoring of electrochemical reactions, several field functions have been renamed as follows:

Previous Name	New Name
Intercalation Particle Accumulated Damage of [particle phase]	**Subgrid Particle Accumulated Damage of [particle phase]**
Intercalation Particle Surface Crack Area Density of [particle phase]	**Subgrid Particle Crack Surface Area Density of [particle phase]**
Intercalation Particle Film Resistance Area of [particle phase]	**Subgrid Particle Film Resistance Area of [particle phase]**

Previous Name	New Name
Intercalation Particle Surface Film Thickness of [film phase]	**Subgrid Particle Surface Film Thickness of [film phase]**

Post-Processing

Planned Removal of Block-Mapped Coordinate System (2606)

The block-mapped coordinate system has been deprecated starting in the current release and is planned to be removed in version 2606.

Change to Monitor Update Controls

The monitor node now has its own **Update** sub-node which offers in-depth control over when and how an update action occurs. The related properties *Enabled* (for activating updates) and *Trigger* (for selecting the type of update event) are now available in both the monitor node and its **Update** sub-node for convenience.

Changes to Report Error Handling

The current release deals with errors in report computation in the following new ways:

- The new *Ignore Not A Number (NaN)* property of the **Reports** manager, when activated, causes any report that fails to compute a value to return a non-computed value instead of NaN (Not a Number).

  The alternate non-computed value is appropriate for the report type (for example, 0 for sum, integral, or average reports, and DBL_MIN/DBL_MAX for maximum and minimum reports). Should you choose to activate this option, you are advised to interpret your report results with caution.

  This option is deactivated by default. Reports that cannot be computed display NaN in the value column in the Output window or else display a warning dialog for a floating point error.
- The alternate value function `alternateValue` now recognizes report computation errors. In previous releases, an error during the evaluation of a report value would not result in the alternate value. That limitation is no longer present in the current release.

Planned End of Support for TRN File Format

Support for the `.trn` file has been deprecated starting in Simcenter STAR-CCM+ 2402 and is planned for removal from a future version. Please use Solution Histories (`.simh` file format) instead.

Simcenter STAR-CCM+ In-cylinder: Change to Default in ECFM Setups

A new `ecfmProp` material database file (`.mdb`) is now supplied with Simcenter STAR-CCM+. This file contains additional data. Specifically, it contains Lennard-Jones properties that can be used for a more accurate prediction of thermal conductivity for gaseous mixtures. Setting the thermal conductivity property method for the gaseous mixture to Mathur-Saxena Averaging utilizes the Lennard-Jones properties.

Lennard-Jones properties are provided in the new database for all but five fuel species. These species are:

- C7H13 (Gasoline)
- C10.3H18.4 (DieselCLEH)
- C12H23 (Jet-A)
- C6.75H12.24 (GasolineCLEH)

- R1 (Gasoline3Z)

The Mathur-Saxena Averaging thermal conductivity method is now the preferred method for internal combustion applications. However, the appropriate scenarios depend on:

- The choice of combustion model
- Whether the fuel selected contains Lennard-Jones properties

Selecting a fuel that does not contain the Lennard-Jones properties prohibits the use of the Mathur-Saxena Averaging thermal conductivity property method. If any fuel that you select does not contain the Lennard-Jones properties, the thermal conductivity property method used is the default from the previous release. This situation can occur when you select one of the five `ecfmProp` fuels listed earlier, or when you select a fuel from the Standard database. Selecting fuels from the `ecfmProp` database is highly recommended.

The default selection of thermal conductivity property method has changed as shown in the following table, assuming all selected fuels have the Lennard-Jones properties listed in the database:

Default Thermal Conductivity Property Method	Previous Release	Current Release
Cold Flow without Injection	Lewis Number	Mather-Saxena
Cold Flow with Injection	Lewis Number	Mather-Saxena
ECFM-3Z with Injection	Lewis Number	Mather-Saxena
ECFM-CLEH with Injection	Lewis Number	Mather-Saxena
Complex Chemistry with Injection	Lewis Number	Lewis Number
Specified Burn Rate with Injection	Mass-Weighted Mixture	Mass-Weighted Mixture

Simcenter STAR-CCM+ Viewer: Planned Shift of Viewer Technology (2606)

For version 2606, the downloadable (desktop) version of Simcenter STAR-CCM+ Viewer is planned to use the same technology as Simcenter Web Viewer. Its user interface is expected to be very similar to that of the current web-based version.

During this transition, the following features of the legacy desktop version will no longer be supported:

- Advanced rendering
- Ability to save a modified `.sce` file

Depending on market demand, some or all of these features may be reintroduced in the new version.

The new Simcenter STAR-CCM+ Viewer will also be license-free.

CAD Clients: End of Support of CATIA V5-6R2020, NX Versions 2007 and 2206

Support for the following functionality has been discontinued in the current release:

- CATIA V5-6R2020 (R30)
- NX 2007/Simcenter 3D 2022.1
- NX 2206/Simcenter 3D 2206

Turbulence: Planned Removal of V2F K-Epsilon Turbulence Model

The **V2F K-Epsilon** turbulence model has been deprecated starting in Simcenter STAR-CCM+ 2302, has been hidden in the user interface (only available through macros), and is planned for removal from a future version.

The recommended practice is to use one of the Elliptic Blending K-Epsilon turbulence models.

Macro API Changes 2510

This section contains the changes to the macro API since the previous release of Simcenter STAR-CCM+.

Planned End of Volume Shape Node Macros (2602)

Volume Shapes have been removed from the user interface of Simcenter STAR-CCM+ 2410 since this functionality is already in parts. Although those objects may still work in macro codes in some instances, they are planned for complete removal from version 2602.

To translate a shape part, use `SimulationPartManager.class` instead of `VolumeShape.class`. Examples of macro code creating and translating a volume shape (previous release) and a shape part (current release) follow:

Previous Release	Current Release
`Simulation simulation_0 = getActiveSimulation(); Units units_0 = simulation_0.getUnitsManager().getPreferredUnits(Dimensions.Builder().length(1).build()); BrickVolumeShape brickVolumeShape_0 = (BrickVolumeShape) simulation_0.get(VolumeShapeManager.class).createBrickVolumeShape(); LabCoordinateSystem labCoordinateSystem_0 = simulation_0.getCoordinateSystemManager().getLabCoordinateSystem(); brickVolumeShape_0.translate(new DoubleVector(new double[] {0.0, 1.0, 0.0}), new ArrayList<>(Arrays.<Units>asList(units_0, units_0, units_0)), labCoordinateSystem_0);`	`Simulation simulation_0 = getActiveSimulation(); Units units_0 = simulation_0.getUnitsManager().getPreferredUnits(Dimensions.Builder().length(1).build()); MeshPartFactory meshPartFactory_0 = simulation_0.get(MeshPartFactory.class); SimpleBlockPart simpleBlockPart_0 = simulation_0.get(MeshPartFactory.class).createNewBlockPart(simulation_0.get(SimulationPartManager.class)); LabCoordinateSystem labCoordinateSystem_0 = simulation_0.getCoordinateSystemManager().getLabCoordinateSystem(); simulation_0.get(SimulationPartManager.class).translateParts(new ArrayList<>(Arrays.<GeometryPart>asList(simpleBlockPart_0)), new DoubleVector(new double[] {0.0, 1.0, 0.0}), new ArrayList<>(Arrays.<Units>asList(units_0, units_0, units_0)), labCoordinateSystem_0);`

For ignitors in reacting flow simulations, volume shape parts can no longer be used. `VolumeShape.class` must be replaced with `SimpleShapePart.class`.

Previous Release	Current Release
`BrickVolumeShape brickVolumeShape_0 = (BrickVolumeShape) simulation_0.get(VolumeShapeManager.class).createBrickVolumeShape();`	`SimpleBlockPart simpleBlockPart_0 = simulation_0.get(MeshPartFactory.class).createNewBlockPart(simulation_0.get(SimulationPartManager.class));`

Previous Release	Current Release
`ConeVolumeShape coneVolumeShape_0 =(ConeVolumeShape) simulation_0.get(VolumeShapeManager.class).createConeVolumeShape();`	`SimpleConePart simpleConePart_0 = simulation_0.get(MeshPartFactory.class).createNewConePart(simulation_0.get(SimulationPartManager.class));`
`CylinderVolumeShape cylinderVolumeShape_0 =(CylinderVolumeShape) simulation_0.get(VolumeShapeManager.class).createCylinderVolumeShape();`	`SimpleCylinderPart simpleCylinderPart_0 = simulation_0.get(MeshPartFactory.class).createNewCylinderPart(simulation_0.get(SimulationPartManager.class));`
`SphereVolumeShape sphereVolumeShape_0 = (SphereVolumeShape) simulation_0.get(VolumeShapeManager.class).createSphereVolumeShape();`	`SimpleSpherePart simpleSpherePart_0 = simulation_0.get(MeshPartFactory.class).createNewSpherePart(simulation_0.get(SimulationPartManager.class));`

Meshing

Planned End of Initialize Meshing Feature

With the removal of Region-Based Meshing in 2302, the Initialize Meshing command in the macro code has been deprecated starting in version 2406 and is planned for removal from a future version. To update your macros, remove instances of:

```
meshPipelineController_0.initializeMeshPipeline();
```

Automation of Core Mesh Optimizer

The Core Mesh Optimizer has been fully automated, and there are no user settings in the UI of the current release.

Simulation files that were saved in previous releases with *Run Legacy Core Mesh Optimizer* activated are restored with the pre-existing settings.

However, macro codes that access `TetQualityThreshold` and use `LegacyCoreOptimizer` must set the command to `true`. For example:

```
dualAutoMesher_0.setLegacyCoreOptimizer(true);
dualAutoMesher_0.setTetQualityThreshold(0.4); //changed from 0.8
dualAutoMesher_0.setTetOptimizeCycles(1);
```

Macros with a setting of `setLegacyCoreOptimizer(false)` generate an error.

Therefore you are advised to set `LegacyCoreOptimizer` to `true`, or remove this step from your macro.

Introduction of Rotation to Morph Surface Mesh

The Morph Surface Mesh operation has been enhanced to support morphing with the Rotation parameter. This improvement has resulted in changes to the macro code.

Previous Release	Current Release

`Units units_0 = ((Units) simulation_0.getUnitsManager().getObject("m"));`
 	
`surfaceMorphOperation_0.getTranslateVector().setCoordinate(units_0, units_0, units_0, new DoubleVector(new double[] {1.0, 0.0, 0.0}));`
	`surfaceMorphOperation_0.setParametricMode(SurfaceMorphParametricMode.TRANSLATE);`
	
	`TranslationControl translationControl_0 = ((TranslationControl) surfaceMorphOperation_0.getTransforms().getObject("Translate"));`
	
	`Units units_0 = ((Units) simulation_0.getUnitsManager().getObject("m"));`
	
	`translationControl_0.getTranslationVector().setCoordinate(units_0, units_0, units_0, new DoubleVector(new double[] {1.0, 0.0, 0.0}));`

`surfaceMorphOperation_0.setCoordinateSystem(cartesianCoordinateSystem_0);`	`surfaceMorphOperation_0.setParametricMode(SurfaceMorphParametricMode.TRANSLATE);`
	
	`TranslationControl translationControl_0 = ((TranslationControl) surfaceMorphOperation_0.getTransforms().getObject("Translate"));`
	
	`translationControl_0.setCoordinateSystem(cartesionCoordinateSystem_0);`

Material Properties: End of Deprecated Anisotropic Material Property Specification Methods

The material property specification methods **Anisotropic** and **Anisotropic (Legacy)** were deprecated starting in Simcenter STAR-CCM+ 2210 and have been removed from the current release. For details about these methods and the planned replacements, see Material Properties in Important Notes.

Any simulation file saved in a previous release with these deprecated methods will restore in the current release with the `Constant` method along with a warning message. Mapping from the deprecated to the new anisotropic methods is not automatically provided.

Hence, any macros using the deprecated methods listed below do not work in the current release:

- `AnisotropicElectricalConductivityMethod`
- `AnisotropicPermeabilityMethod`
- `AnisotropicPermittivityMethod`
- `FullTensorLegacyThermalConductivityMethod`
- `FullTensorElectricalConductivityMethodWithValues`
- `FullTensorPermeabilityMethodWithValues`
- `FullTensorPermittivityMethodWithValues`

- `FullTensorThermalConductivityMethodWithValues`

The recommended practice is to use any of the new symmetric anisotropic methods:

- `AnisotropicElectricalConductivityMethodWithValues`
- `AnisotropicPermeabilityMethodWithValues`
- `AnisotropicPermittivityMethodWithValues`
- `AnisotropicThermalConductivityMethodWithValues`

Aeroacoustics: End of Acoustic Suppression Zone Model

The Acoustic Suppression Zone model, which is accessed only through macros and does not appear in the Simcenter STAR-CCM+ UI, has been removed. Please use the Sponge Layer model instead.

To update your macros, be sure to remove instructions that include the strings `BufferZone`, `AcousticsSuppressionOption`, or `AcousticSuppressionZone`.

To use the Sponge Layer model, replace strings as follows:

Previous Release	Current Release
`physicsContinuum_0.enable(BufferZoneModel.class);`	`physicsContinuum_0.enable(SpongeLayerModel.class);`

Multiphase

End of Drag Correlated Option for Lift Correction

The *Drag Correlated* option for **Lift Correction** was deprecated starting in Simcenter STAR-CCM+ 2402 and has been removed from the current release. As a result, `DragCorrelatedLiftCoefficientCorrectionMethod` has been removed from the macro code of the current release.

In the new release, when `LiftForceModel` is selected, the `DragCorrelatedLiftCoefficientCorrectionMethod` is not an option, and the Constant Lift Coefficient Correction Method is activated by default.

To update your macros, remove all instances of `DragCorrelatedLiftCoefficientCorrectionMethod`.

If you attempt to run a legacy macro in the current release of Simcenter STAR-CCM+, you are expected to see an error message such as:

```
Playing macro /u/cd2ekl/Projects/EMP-3609_deprecateLiftCoeffMethod/
APIMacroChanges.java
error: /u/cd2ekl/Projects/EMP-3609_deprecateLiftCoeffMethod/
APIMacroChanges.java:40: error: cannot find symbol
     ((LiftCoefficientCorrectionMethodManager)
liftForceModel_1.getCoefficientCorrectionMethods()).setMethod(DragCorrelatedL
iftCoefficientCorrectionMethod.class);
  symbol:   class DragCorrelatedLiftCoefficientCorrectionMethod
  location: class macro.APIMacroChanges
```

An example of macro code from the previous release of Simcenter STAR-CCM+, which requires such an update, follows:

```
  private void execute0() {
    Simulation simulation_0 =
      getActiveSimulation();
    PhysicsContinuum physicsContinuum_0 =
      ((PhysicsContinuum)
simulation_0.getContinuumManager().getContinuum("Physics 1"));
    MultiPhaseInteractionModel multiPhaseInteractionModel_0 =

physicsContinuum_0.getModelManager().getModel(MultiPhaseInteractionModel.clas
s);
    PhaseInteraction phaseInteraction_0 =
      ((PhaseInteraction)
multiPhaseInteractionModel_0.getPhaseInteractionManager().getPhaseInteractio
n("Water-Air"));
    LiftForceModel liftForceModel_0 =
      phaseInteraction_0.getModelManager().getModel(LiftForceModel.class);
    phaseInteraction_0.disableModel(liftForceModel_0);
    phaseInteraction_0.enable(LiftForceModel.class);
    LiftForceModel liftForceModel_1 =
      phaseInteraction_0.getModelManager().getModel(LiftForceModel.class);
    ((LiftCoefficientCorrectionMethodManager)
liftForceModel_1.getCoefficientCorrectionMethods()).setMethod(DragCorrelatedL
iftCoefficientCorrectionMethod.class);
  }
```

Changes for Generalized Phase Replacement Model

With improvements of VOF phase replacement in the current release, macro codes have changed for selecting the Phase Replacement model and for adjusting the Phase Replacement Volume Fraction Limit.

<table>
<tr><th>Previous Release</th><th>Current Release</th></tr>
<tr><td><pre>
import java.util.*;

import star.common.;
import star.base.neo.;
import star.vof.*;

public class
phase_replacement_model_selection_ol
d extends StarMacro {

  public void execute() {
    execute0();
  }

  private void execute0() {
    Simulation simulation_0 =
      getActiveSimulation();

    PhysicsContinuum
physicsContinuum_0 =
      ((PhysicsContinuum)
simulation_0.getContinuumManager().g
etContinuum("Physics 1"));

    MultiPhaseInteractionModel
</pre></td><td><pre>
import java.util.*;

import star.common.;
import star.base.neo.;
import star.mixturemultiphase.*;

public class
phase_replacement_model_selection_ne
w extends StarMacro {

  public void execute() {
    execute0();
  }

  private void execute0() {
    Simulation simulation_0 =
      getActiveSimulation();

    PhysicsContinuum
physicsContinuum_0 =
      ((PhysicsContinuum)
simulation_0.getContinuumManager().g
etContinuum("Physics 1"));

    MultiPhaseInteractionModel
</pre></td></tr>
</table>

Previous Release	Current Release

multiPhaseInteractionModel_0 =
 	
physicsContinuum_0.getModelManager()
.getModel(MultiPhaseInteractionModel
.class);
 	
PhaseInteraction
phaseInteraction_0 =
((PhaseInteraction)
multiPhaseInteractionModel_0.getPhas
eInteractionManager().getPhaseIntera
ction("Phase Interaction 1"));
 	
phaseInteraction_0.enable(VofPhaseRe
placementModel.class);
 	
VofPhaseReplacementModel
vofPhaseReplacementModel_0 =
 	
phaseInteraction_0.getModelManager()
.getModel(VofPhaseReplacementModel.c
lass);
 	
PhaseReplacementVolumeFractionLimitP
rofile
phaseReplacementVolumeFractionLimitP
rofile_0 =
 	
((PhaseReplacementVolumeFractionLimi
tProfile)
vofPhaseReplacementModel_0.getPhaseR
eplacementVolumeFractionLimitProfil
e());
 	
Units units_0 =
((Units)
simulation_0.getUnitsManager().getOb
ject(""));
 	
phaseReplacementVolumeFractionLimitP
rofile_0.getMethod(ConstantScalarPro
fileMethod.class).getQuantity().setV
alueAndUnits(1.0, units_0);
}
}
	multiPhaseInteractionModel_0 =
	
	physicsContinuum_0.getModelManager()
	.getModel(MultiPhaseInteractionModel
	.class);
	
	PhaseInteraction
	phaseInteraction_0 =
	((PhaseInteraction)
	multiPhaseInteractionModel_0.getPhas
	eInteractionManager().getPhaseIntera
	ction("Phase Replacement"));
	
	phaseInteraction_0.enable(MmpPhaseRe
	placementModel.class);
	
	MmpPhaseReplacementModel
	mmpPhaseReplacementModel_1 =
	
	phaseInteraction_0.getModelManager()
	.getModel(MmpPhaseReplacementModel.c
	lass);
	
	PhaseReplacementVolumeFractionLimitP
	rofile
	phaseReplacementVolumeFractionLimitP
	rofile_0 =
	
	((PhaseReplacementVolumeFractionLimi
	tProfile)
	mmpPhaseReplacementModel_1.getPhaseR
	eplacementVolumeFractionLimitProfil
	e());
	
	Units units_0 =
	((Units)
	simulation_0.getUnitsManager().getOb
	ject(""));
	
	phaseReplacementVolumeFractionLimitP
	rofile_0.getMethod(ConstantScalarPro
	fileMethod.class).getQuantity().setV
	alueAndUnits(1.0, units_0);
	}
	}

DEM: Changes to Workflow for Specifying DEM Multiphase Interactions

Modification of the *Connectivity* property (that is, transferred component mapping) through the Component Mapping model in the context of DEM phase interaction models (such as Absorption or Liquid Component Transfer) has been changed to perform the modification through the individual phase pair.

This only affects DEM phase interactions that include (liquid) component mass transfer.

The following example is for an individual phase pair called `Tablets <-> Tablets`:

<table>
<tr><th>Previous Release</th><th>Current Release</th></tr>
<tr><td><pre>
InterphaseComponentMappingModel interphaseComponentMappingModel_0 = phaseInteraction_0.getModelManager().getModel(InterphaseComponentMappingModel.class);
interphaseComponentMappingModel_0.setMixtureComponentPairListInput(new StringVector(new String[]{"Coating Liquid", "Coating Liquid"}));
</pre></td><td><pre>
import star.common.InteractionPhasePair;
import star.lagrangian.dem.DemPhaseInteractionModel;
import star.multiphase.TransferredComponentManager;
…
DemPhaseInteractionModel demPhaseInteractionModel_0 = phaseInteraction_0.getModelManager().getModel(DemPhaseInteractionModel.class);
InteractionPhasePair interactionPhasePair_0 = demPhaseInteractionModel_0.getInteractionPhasePairManager().getInteractionPhasePair("Tablets <-> Tablets");
TransferredComponentManager transferredComponentManager_0 = ((TransferredComponentManager) interactionPhasePair_0.getTransferredComponentManager());
transferredComponentManager_0.setTransferredComponents(new StringVector(new String[] {"Coating Liquid", "Coating Liquid"}));
</pre></td></tr>
</table>

Eulerian Multiphase (EMP)

Change to Message for Single Component Crystal Growth Models

The Simcenter STAR-CCM+ workspace messaging for the Single Component Crystal Growth models has improved, resulting in changes to the macro code. To update your macros:

- Change instances of

  ```
  singleComponentCrystalGrowthModel_0.setTargetSolventComponent(liquidComponent_0);
  ```

  to

  ```
  singleComponentCrystalGrowthModel_0.setTargetSoluteComponent(liquidComponent_0);
  ```

- Change instances of

  ```
  singleComponentCrystalGrowthFromMeltModel_0.setTargetSolventComponent(liquidComponent_0);
  ```

  to

  ```
  singleComponentCrystalGrowthFromMeltModel_0.setTargetSoluteComponent(liquidComponent_0);
  ```

Dispersed Particle Coalescence Renamed to Coagulation

In Discrete Quadrature S-Gamma and AMUSIG, the terminology has changed for aggregating particles from Coalescence to Coagulation.

For Continuous-Dispersed Phase Interactions with particles, when a simulation with models that had `Coalescence` in their names is opened in the current release, those models now have names with `Coagulation`.

Names and code strings for dispersed liquids and dispersed gases remain unchanged.

The table below shows a list of changed macro code strings, and the following tables show examples of macro code updates.

Previous Release (for dispersed gas, liquid and particles)	Current Release (for dispersed particles)
AMUSIG	
`MusigCoalescenceModel`	`MusigCoagulationModel`
`MusigTurbulentCoalescenceModelGroup`	`MusigTurbulentCoagulationModelGroup`
`MusigLaminarCoalescenceModelGroup`	`MusigLaminarCoagulationModelGroup`
`UniformCoalescenceEfficiencyModel`	`UniformCoagulationEfficiencyModel`
`UniformCoalescenceEfficiencyProfile`	`UniformCoagulationEfficiencyProfile`
`FilmDrainageCoalescenceEfficiencyModel`	`FilmDrainageCoagulationEfficiencyModel`
`FilmDrainageCoalescenceEfficiencyPrefactorProfile`	`FilmDrainageCoagulationEfficiencyPrefactorProfile`
Discrete Quadrature S-Gamma	
`SgammaDiscreteQuadratureCoalescenceModel`	`SgammaDiscreteQuadratureCoagulationModel`
`SgammaDiscreteQuadratureCoalescenceModel.getSgammaCoalescenceEfficiencyMethodManager(...)`	`SgammaDiscreteQuadratureCoagulationModel.getSgammaCoagulationEfficiencyMethodManager(...)`
`SgammaCoalescenceEfficiency`	`SgammaCoagulationEfficiency`
`SgammaCoalescenceEfficiencyMethodManager`	`SgammaCoagulationEfficiencyMethodManager`

For dispersed particles, AMUSIG

Previous Release	Current Release

`phaseInteraction_0.enable(MusigCoalescenceModel.class);`
 	
`phaseInteraction_0.enable(MusigLaminarCoalescenceModelGroup.class);`
 	
`phaseInteraction_0.enable(UniformCollisionRateModel.class);`
	`phaseInteraction_0.enable(MusigCoagulationModel.class);`
	
	`phaseInteraction_0.enable(MusigLaminarCoagulationModelGroup.class);`
	
	`phaseInteraction_0.enable(UniformCollisionRateModel.class);`

Previous Release	Current Release
`phaseInteraction_0.enable(UniformCoalescenceEfficiencyModel.class);` `UniformCoalescenceEfficiencyModel uniformCoalescenceEfficiencyModel_0 =` `phaseInteraction_1.getModelManager().getModel(UniformCoalescenceEfficiencyModel.class);` `phaseInteraction_1.disableModel(uniformCoalescenceEfficiencyModel_0);` `phaseInteraction_1.enable(FilmDrainageCoalescenceEfficiencyModel.class);`	`phaseInteraction_0.enable(UniformCoagulationEfficiencyModel.class);` `UniformCoagulationEfficiencyModel uniformCoagulationEfficiencyModel_0 =` `phaseInteraction_1.getModelManager().getModel(UniformCoagulationEfficiencyModel.class);` `phaseInteraction_1.disableModel(uniformCoagulationEfficiencyModel_0);` `phaseInteraction_1.enable(FilmDrainageCoagulationEfficiencyModel.class);`

For dispersed particles, Discrete Quadrature S-Gamma

Previous Release	Current Release
`phaseInteraction_0.enable(SgammaDiscreteQuadratureCoalescenceModel.class);` `((SgammaCoalescenceEfficiencyMethodManager) sgammaDiscreteQuadratureCoalescenceModel_0.getSgammaCoalescenceEfficiencyMethodManager(dispersedFlowRegime_0)).setMethod(FunctionInteractionCoefficientMethod.class);` `FunctionInteractionCoefficientMethod` `functionInteractionCoefficientMethod_0 =` `((SgammaCoalescenceEfficiencyMethodManager) sgammaDiscreteQuadratureCoalescenceModel_0.getSgammaCoalescenceEfficiencyMethodManager(dispersedFlowRegime_0)).getMethod(FunctionInteractionCoefficientMethod.class);`	`phaseInteraction_0.enable(SgammaDiscreteQuadratureCoagulationModel.class);` `((SgammaCoagulationEfficiencyMethodManager) sgammaDiscreteQuadratureCoagulationModel_0.getSgammaCoagulationEfficiencyMethodManager(dispersedFlowRegime_0)).setMethod(FunctionInteractionCoefficientMethod.class);` `FunctionInteractionCoefficientMethod` `functionInteractionCoefficientMethod_0 =` `((SgammaCoagulationEfficiencyMethodManager) sgammaDiscreteQuadratureCoagulationModel_0.getSgammaCoagulationEfficiencyMethodManager(dispersedFlowRegime_0)).getMethod(FunctionInteractionCoefficientMethod.class);`

Lagrangian Multiphase (LMP)

Changes to Rotation-Related Models

In the current release, certain models and variables related to particle rotation have been transferred from DEM to LMP, resulting in changes to the macro code. Specifically, to update your macros, search for instances of the following strings and update them as shown in the table below.

Previous Release	Current Release
star.lagrangian.dem.AngularVelocityProfile	star.lagrangian.AngularVelocityProfile
star.lagrangian.dem.DragTorqueModel	star.lagrangian.DragTorqueModel
star.lagrangian.dem.FunctionRotationalDragCoefficientMethod	star.lagrangian.FunctionRotationalDragCoefficientMethod
star.lagrangian.dem.FunctionSpinLiftCoefficientMethod	star.lagrangian.FunctionSpinLiftCoefficientMethod
star.lagrangian.dem.InjectorAngularVelocity	star.lagrangian.InjectorAngularVelocity
star.lagrangian.dem.InjectorAngularVelocityMagnitude	star.lagrangian.InjectorAngularVelocityMagnitude
star.lagrangian.dem.InjectorAngularVelocityOption	star.lagrangian.InjectorAngularVelocityOption
star.lagrangian.dem.ParticleSpinLiftCoefficientMethod	star.lagrangian.ParticleSpinLiftCoefficientMethod
star.lagrangian.dem.ParticleSpinLiftCoefficientMethodEditor	star.lagrangian.ParticleSpinLiftCoefficientMethodEditor
star.lagrangian.dem.ParticleSpinLiftCoefficientMethodManager	star.lagrangian.ParticleSpinLiftCoefficientMethodManager
star.lagrangian.dem.ParticleSpinLiftForceModel	star.lagrangian.ParticleSpinLiftForceModel
star.lagrangian.dem.RotationalDragCoefficientMethod	star.lagrangian.RotationalDragCoefficientMethod
star.lagrangian.dem.RotationalDragCoefficientMethodEditor	star.lagrangian.RotationalDragCoefficientMethodEditor
star.lagrangian.dem.RotationalDragCoefficientMethodManager	star.lagrangian.RotationalDragCoefficientMethodManager
star.lagrangian.dem.SommerfeldDragTorqueMethod	star.lagrangian.SommerfeldDragTorqueMethod
star.lagrangian.dem.SommerfeldSpinLiftCoefficientMethod	star.lagrangian.SommerfeldSpinLiftCoefficientMethod

Changes to Hysteresis Modeling

The current release includes improved compatibility between user-defined field functions and hysteresis modeling. This improvement has resulted in changes to the macro code for setting Contact Angle Hysteresis.

Previous Release

```
import java.util.*;

import star.common.*;
import star.base.neo.*;
import star.vof.*;

public class
activateContactAngleHysteresis
extends StarMacro {

  public void execute() {
    execute0();
  }

  private void execute0() {

    Simulation simulation_0 =
      getActiveSimulation();

    PhysicsContinuum
physicsContinuum_0 =
      ((PhysicsContinuum)
simulation_0.getContinuumManager().g
etContinuum("Physics 1"));

    MultiPhaseInteractionModel
multiPhaseInteractionModel_0 =

physicsContinuum_0.getModelManager()
.getModel(MultiPhaseInteractionModel
.class);

    PhaseInteraction
phaseInteraction_0 =
      ((PhaseInteraction)
multiPhaseInteractionModel_0.getPhas
eInteractionManager().getPhaseIntera
ction("Phase Interaction 1"));

    SurfaceTensionModel
surfaceTensionModel_0 =

phaseInteraction_0.getModelManager()
.getModel(SurfaceTensionModel.class)
;


surfaceTensionModel_0.setContactAngl
eHysteresis(true);
  }
}
```

Current Release

```
import java.util.*;

import star.multiphase.*;
import star.common.*;
import star.base.neo.*;

public class
activateContactAngleHysteresis
extends StarMacro {

  public void execute() {
    execute0();
  }

  private void execute0() {

    Simulation simulation_0 =
      getActiveSimulation();

    Region region_0 =

simulation_0.getRegionManager().getR
egion("Region_2D");

    Boundary boundary_0 =

region_0.getBoundaryManager().getBou
ndary("Wall");

    PhaseConditions
phaseConditions_0 =
      ((PhaseConditions)
boundary_0.get(PhaseConditionsManage
r.class).getPhaseConditions("Phase
Interaction 1"));

    ContactAngleHysteresisOption
contactAngleHysteresisOption_0 =

phaseConditions_0.getPhaseConditionM
anager().get(ContactAngleHysteresisO
ption.class);


contactAngleHysteresisOption_0.setOp
tionEnabled(true);
  }
}
```

Change to Collision Detection

The Lagrangian Multiphase Collision Detection Solver now has two Collision Detection manager objects: Volume Collision and the newly added Shell Collision.

To update your existing macros, replace instances of `getDetectionMethods()` with `getVolumeDetectionMethods()`.

<table>
<tr><th>Previous Release</th><th>Current Release</th></tr>
<tr><td>

```
import java.util.*;

import star.common.*;
import star.lagrangian.collision.*;
import star.lagrangian.*;

public class macro1_old extends
StarMacro {

  public void execute() {
    execute0();
  }

  private void execute0() {

    Simulation simulation_0 =
      getActiveSimulation();

    LagrangianMultiphaseSolver
lagrangianMultiphaseSolver_0 =
      ((LagrangianMultiphaseSolver)
simulation_0.getSolverManager().getS
olver(LagrangianMultiphaseSolver.cla
ss));

    CollisionDetectionSolver
collisionDetectionSolver_0 =
      ((CollisionDetectionSolver)
lagrangianMultiphaseSolver_0.getSolv
ers().getSolver(CollisionDetectionSo
lver.class));


collisionDetectionSolver_0.getDetect
ionMethods().setMethod(CellBasedColl
isionDetectionMethod.class);
```

</td><td>

```
import java.util.*;

import star.common.*;
import star.lagrangian.collision.*;
import star.lagrangian.*;

public class macro1_new extends
StarMacro {

  public void execute() {
    execute0();
  }

  private void execute0() {

    Simulation simulation_0 =
      getActiveSimulation();

    LagrangianMultiphaseSolver
lagrangianMultiphaseSolver_0 =
      ((LagrangianMultiphaseSolver)
simulation_0.getSolverManager().getS
olver(LagrangianMultiphaseSolver.cla
ss));

    CollisionDetectionSolver
collisionDetectionSolver_0 =
      ((CollisionDetectionSolver)
lagrangianMultiphaseSolver_0.getSolv
ers().getSolver(CollisionDetectionSo
lver.class));


collisionDetectionSolver_0.getVolume
DetectionMethods().setMethod(CellBas
edCollisionDetectionMethod.class);
```

</td></tr>
</table>

Electromagnetism

Changes to Framework

In view of the new finite-element high-order models planned for future releases, the high-order user experience is being standardized with the introduction of a new code structure. This structure will be shared by all future finite element high-order models while also providing other ways for you to control the polynomial order definition.

To ensure consistent performance with your finite-element modeling, it is recommended that you update your macros in advance as shown in the following example.

<table>
<tr><th>Previous Release</th><th>Current Release</th></tr>
<tr><td>

```
import java.util.*;

import star.common.*;
import star.base.neo.*;
import
star.electromagnetism.magneticpotent
ial.fem.*;

public class Macro_20_04 extends
StarMacro {

  public void execute() {
    execute0();
  }

  private void execute0() {

    Simulation simulation_0 =
      getActiveSimulation();

    PhysicsContinuum
physicsContinuum_0 =
      ((PhysicsContinuum)
simulation_0.getContinuumManager().g
etContinuum("Physics 1"));


FiniteElementMagneticVectorPotential
Model
finiteElementMagneticVectorPotential
Model_0 =

physicsContinuum_0.getModelManager()
.getModel(FiniteElementMagneticVecto
rPotentialModel.class);


finiteElementMagneticVectorPotential
Model_0.setFiniteElementOrder(2);
  }
}
```

</td><td>

```
import java.util.*;

import star.common.*;
import star.base.neo.*;
import star.fea.common.models.*;
import
star.electromagnetism.magneticpotent
ial.fem.*;

public class Macro_20_06 extends
StarMacro {

  public void execute() {
    execute0();
  }

  private void execute0() {

    Simulation simulation_0 =
      getActiveSimulation();

    PhysicsContinuum
physicsContinuum_0 =
      ((PhysicsContinuum)
simulation_0.getContinuumManager().g
etContinuum("Physics 1"));


FiniteElementMagneticVectorPotential
Model
finiteElementMagneticVectorPotential
Model_0 =

physicsContinuum_0.getModelManager()
.getModel(FiniteElementMagneticVecto
rPotentialModel.class);


FeMagneticVectorPotentialPOrderProvi
ders
feMagneticVectorPotentialPOrderProvi
ders_0 =

finiteElementMagneticVectorPotential
Model_0.getPOrderProviders();

    FePOrderProfileProvider
fePOrderProfileProvider_0 =

feMagneticVectorPotentialPOrderProvi
ders_0.getProvider(FePOrderProfilePr
ovider.class);

    FePOrderProfile
fePOrderProfile_0 =
```

</td></tr>
</table>

Previous Release	Current Release

	`fePOrderProfileProvider_0.getScalarProfile();`
	
	`IntegerValue integerValue_0 =`
	
	`fePOrderProfile_0.getMethod(ConstantIntegerProfileMethod.class).getQuantity();`
	
	`integerValue_0.getQuantity().setValue(2.0);`
	`}`
	`}`

Changes to Current Direction

The following classes have been moved from `star.electromagnetism.magneticpotential.fem` to `star.electromagnetism.common`:

- `CurrentDirectionSpecification`
- `ElectricCurrentDirectionOption`

As a result, update the import statements in your macros as follows:

- For `CurrentDirectionSpecification`:

  Change

  ```
  import star.electromagnetism.magneticpotential.fem.*;
  ```

  to

  ```
  import star.electromagnetism.common.*;
  ```

- For `ElectricCurrentDirectionOption`:

  Change

  ```
  import star.electromagnetism.magneticpotential.fem.*;
  ```

  to

  ```
  import star.electromagnetism.common.*;
  ```

Electrochemistry

Renaming of Intercalation Particle Objects

Due to refactoring of electrochemical reactions, the object

```
star.electrochemistry.electrochemicalreactions.IntercalationParticleCrackSurf
aceAreaDensityProfile
```

has been renamed to

```
star.electrochemistry.electrochemicalreactions.SubGridParticleCrackSurfaceAreaDensityProfile
```

If any of your existing macros use this object, search for instances of the following strings and update them as shown in the following table:

Previous Release	Current Release
`IntercalationParticleAccumulatedDamage[particle phase]`	`SubgridParticleAccumulatedDamage[particle phase]`
`IntercalationParticleSurfaceCrackAreaDensity[particle phase]`	`SubgridParticleCrackSurfaceAreaDensity[particle phase]`
`IntercalationParticleFilmResistanceArea[particle phase]`	`SubgridParticleFilmResistanceArea[particle phase]`
`IntercalationParticleSurfaceFilmThickness[film phase]`	`SubgridParticleSurfaceFilmThickness[film phase]`

Changes to Porous Phases

Solid Ion and Electrodynamic Potential models in porous phases now use the tortuosity values associated with the porous phase, that is, the value from the region's `PhaseConditionsManager`. In previous releases, they obtained their values from the **Physics Values** object tree folder of the relevant region.

When populating `VolumeTortuosityProfile` objects for these two models, you must obtain the profile from the appropriate `ValueManager` (see examples below).

If you have several phases with one of these two models, a `VolumeTortuosityProfile` needs to be set for every one of these phases.

If you have another model that needs tortuosity within the porous region's fluid domain, such as a species model, the old code needs to stay in place. The new code is additional and allows you to set distinct tortuosity values for fluid and solid porous phases.

Previous Release	Current Release
`VolumeTortuosityProfile tortuosity = porousRegion1.getValues().get(VolumeTortuosityProfile.class);`	`VolumeTortuosityProfile tortuosity = porousRegion1.get(PhaseConditionsManager.class).getPhaseConditions("Phase 1").getPhaseValueManager();`

CAD Package Support

This section contains a list of supported CAD Clients, the CAD import versions, and the CAD export versions.

CAD Packages for CAD Clients

When installing CAD Clients, the target CAD package must be present on the installation machine. Without this, you can force the installation of a particular sub-component, but there is no guarantee that this will work correctly with your CAD package. The following CAD packages are required to run the CAD Clients:

CAD Client	CAD Package Version	Comments
Simcenter STAR-CCM+ Client for CATIA V5	CATIA V5-6R2021 (R31)	An additional `ME2` or `MD2 + GPS` configuration license is required from Dassault Systemes to run Simcenter STAR-CCM+ Client for CATIA V5.
	CATIA V5-6R2022 (R32)	
	CATIA V5-6R2023 (R33)	
	CATIA V5-6R2024 (R34)	
	CATIA V5-6R2025 (R35)	
Simcenter STAR-CCM+ Client for NX	NX 2212/Simcenter 3D 2212	For all supported version of NX or Simcenter 3D, you can use a batch version of NX or Simcenter 3D on Linux in conjunction with Simcenter STAR-CCM+.
	NX 2306/Simcenter 3D 2306	
	NX 2312/Simcenter 3D 2312	
	NX 2406/Simcenter 3D 2406	
	NX 2412/Simcenter 3D 2412	
	NX 2506/Simcenter 3D 2506	
Simcenter STAR-CCM+ Client for Creo	Creo Parametric 7.0	
	Creo Parametric 8.0	
	Creo Parametric 9.0	
	Creo Parametric 10.0	
	Creo Parametric 11.0	
	Creo Parametric 12.0	
Simcenter STAR-CCM+ Client for Inventor	Autodesk Inventor 2019	
	Autodesk Inventor 2020	
	Autodesk Inventor 2021	
	Autodesk Inventor 2022	
	Autodesk Inventor 2023	

CAD Import Versions

CAD File Formats for Siemens Adapter

File Format	File Extensions	Versions Supported	Add-on Required	Type of Import
ACIS	.sat, .sab	Up to 2023 1.0	CAD Exchange	B-rep
Autodesk Inventor	.ipt, .iam	Up to 2025	CAD Exchange	B-rep
CATIA V4	.model	Up to 4.2.5	CAD Exchange	B-rep
CATIA V5	.CATPart, .CATProduct, .CGR	Up to V5-6R2024 SP4	CAD Exchange	B-rep
CATIA V6/3DExperience	.3DXML	Up to R2025x	CAD Exchange	B-rep
Creo - Pro/E	.prt, .asm	Up to Creo 11	CAD Exchange	B-rep
IFC	.ifc	IFC2x3, IFC4	CAD Exchange	B-rep
IGES	.igs, .iges	5.1, 5.2, 5.3	None	B-rep
JT	.jt	Up to v10.7.1	None	B-rep
Rhino	.3dm	Up to 7	CAD Exchange	B-rep
Solid Edge	.par, .asm	Windows up to 2025 Linux — no support	None	B-rep
SolidWorks	.sldprt, .sldasm	Up to 2025	CAD Exchange	B-rep
STEP	.stp, .step	AP 203 Ed2, AP 214 Ed3, AP 242 Ed1, Ed2, and Ed3	None	B-rep
NX	.prt	Up to NX2506	None	B-rep

Siemens Neutral Formats

File Format	File Extensions	Versions Supported	Add-on Required	Type of Import
Parasolid	.x_t, .x_b, .xmt_txt, .xmt_bin	Up to 37.1.222	None	B-rep
PLMXML	.plmxml, .xml	Up to 7.2.2.044	None	N/A

CAD Export Versions

CAD export is available on all platforms. 3D-CAD supports exporting to the following file formats:

File Format	File Extensions	Versions Supported	Add-on Required	Type of Export
Parasolid	.x_t, .x_b	37.1.222	None	B-rep

File Format	File Extensions	Versions Supported	Add-on Required	Type of Export
IGES	.igs, .iges	5.3	None	B-rep
STEP	.stp, .step	AP 203 E1/E2, AP 214, AP 242	None	B-rep

External Packages Support

Simcenter STAR-CCM+ can interact with a range of third-party software tools, either by importing their meshes and data, exporting to their formats, or through co-simulation.

Third-Party Software

Simcenter STAR-CCM+ supports the following packages:

Package	Provider	Supported Versions	Import	Export	File-Based Coupling	Co-Simulation[1]
Abaqus	SIMULIA-Dassault Systemes	All	✓	✓[2]	✓	
		2024 2023 2022				✓
Simcenter Amesim	Siemens Digital Industries Software	2019.2 2019.1 17	-	-	-	✓
CGNS Format	Open source standard https://cgns.org/	4.3.0	✓	✓	✓	
ANSYS	ANSYS Inc.	All	✓[3]	✓[2]	✓	
Simcenter Battery Design Studio	Siemens Digital Industries Software	**2510**	✓	-	-	-
Ensight	ANSYS Inc.	**10.1** (recommended) 9 8	✓	✓[4]	-	-
FieldView	FieldView CFD	15	-	✓[4]	-	-
gPROMS	Process Systems Enterprise Limited - A Siemens Business	gPROMS FormulatedProducts 2.0 gPROMS ModelBuilder 7.0 gPROMS ProcessBuilder 2.0	-	✓[4]	✓	-
GT-SUITE	Gamma Technologies Inc.	2024 2023 2022	-	-	-	✓
JMAG	JSOL Corporation	JSOL defines the JMAG versions that are supported				✓
Simcenter Nastran	Siemens Digital Industries Software	All	✓[3]	✓[2]	✓	
		2406 2312				✓

Package	Provider	Supported Versions	Import	Export	File-Based Coupling	Co-Simulation[1]
		2306 2212 2206				
MSC Nastran	MSC Software Solutions	All	✓[3]	✓[2]	✓	-
TAITherm (Formerly known as RadTherm)	ThermoAnalytics Inc.	All	✓	✓[2]	✓	-
Simcenter SPEED	Siemens Digital Industries Software	**2510**	✓	-	-	-
Tecplot 360	Tecplot Inc.	**2015**		✓[4]	-	-

1 Currently, co-simulation does not support host specification using the IPv6 communication protocol
2 Exports solution data, but not the mesh
3 There is no version restriction on the files to import
4 Exports mesh and solution data

Known Issues

This section contains a list of known issues that may occur in special circumstances. None of the issues affect the validity of the results that you obtain with Simcenter STAR-CCM+.

In the following topics, the symbol New is used to identify issues that are new in this release. Only issues where resolution is related to a third-party product or system provider, and is outside of our control, are listed here.

A number of these issues pertain to Message Passing Interfaces (MPIs). For more information about MPIs, see "Supported MPI Implementations" in the Simcenter STAR-CCM+ User Guide.

Contents:

Issues Relevant to All Operating Systems

This section contains a list of known issues that affect Simcenter STAR-CCM+ on all operating systems.

All Supported MPI Libraries Are Now Supporting the MPI-3 Shared Memory Table New

In a reacting flow simulation, when you generate a flamelet table in parallel and run the simulation with such a table, it is recommended that you use an MPI that implements the newer MPI 3 standard. All supported MPIs distributed with Simcenter STAR-CCM+ are now MPI-3-compliant and can benefit from memory savings.

Use MPI 3-Compliant MPI Implementation to Reduce Memory Requirement of Tables

Beginning with Simcenter STAR-CCM+ 2506, if you are working with large tables, using MPI 3 significantly reduces memory consumption compared to previous releases, if you are running in parallel on a workstation or you have multiple Simcenter STAR-CCM+ processes on cluster nodes.

On Windows, the default MPI option `MS` is not MPI 3-compliant, therefore it does not support shared memories for tables. Consider the MPI option `intel` if it is compatible with your hardware.

The same operating principle applies to flamelet tables.

Possible Performance Issues on AMD Zen 2 and Zen 3 CPUs

For selected cases it is possible that Simcenter STAR-CCM+ simulations do not perform optimally with the automatically selected AMD AOCL math library on older generations of AMD CPUs. If performance regressions are observed it may help to use an Intel MKL version from a previous Simcenter STAR-CCM+ installation. For example, you can use Intel MKL 2020.0.106 from Simcenter STAR-CCM+ 2410 by providing the location of `libmkl_rt.20.so` as the argument to the option `-flexiblaslib` and setting the environment variable `MKL_DEBUG_CPU_TYPE=5`.

Co-Simulation with Abaqus 2023: Abaqus Restart Files

When the time-step in Abaqus is smaller than the coupling time interval, Abaqus may ignore the `NUMBER INTERVAL` keyword specified for the `*RESTART` command in the Abaqus input (*.inp) file. Therefore, Abaqus may not write the restart frames at the interval specified using the `NUMBER INTERVAL` keyword.

System Dialog Required for Exporting Simulation Guide to PDF

PDF exports from the Simcenter STAR-CCM+ simulation guide have been observed to contain text overlap. This issue has been attributed to the third-party library Chromium.

To avoid this overlap, use the system dialog:

1. In the simulation guide, after activating the **Print** functionality, click **More settings** in the right-hand sidebar.
2. At the bottom of the sidebar, click **Print using system dialog**.

Intel Xe Found to Cause Display Issues

Scalar displays have been observed to appear incorrect on Windows systems using Intel Xe / Intel Iris Xe graphics. This issue has been attributed to the drivers that are currently supplied with Intel Xe graphics (part of recent Intel CPUs as well as dedicated GPUs). At the time of writing, desktop and mobile computers with Intel Core processors using their integrated Intel XE graphics units may be affected. This applies to the 11th, 12th, and 13th processor generations, that is, Intel Core i(3/5/7)-(11/12/13)XXXX.

The situation on Linux regarding this issue is unknown.

As a remedy, switch the *Contour Style* property of the scalar displayer to **Filled** or **Smooth Filled**.

MPI Issues Found with Simcenter STAR-CCM+ to Simcenter STAR-CCM+ Co-Simulation

Issues have been observed when MPI applications are used to spawn a second parallel Simcenter STAR-CCM+ simulation from an existing parallel simulation.

You are advised to use Resource Manager for this type of co-simulation. See the section "Running a Co-Simulation Using Resource Manager" in the Simcenter STAR-CCM+ User Guide.

Custom Display Scaling Not Supported in Current Release

In the current release, it is recommended that you avoid using your system display settings for scaling Simcenter STAR-CCM+. Issues have been observed such as blurry fonts, incorrectly registered mouse clicks, and the inability to select objects in a scene display.

To prevent scaling of Simcenter STAR-CCM+ in Linux, add `-jvmargs -Dsun.java2d.uiScale=1.0` to the command line.

To change the size of Simcenter STAR-CCM+ client fonts, see either of the following:

- All platforms: "Changing the Workspace Font Size" in the Simcenter STAR-CCM+ User Guide
- Windows 10: Preventing Windows from Scaling Simcenter STAR-CCM+

AVX-512 Optimizations on Newer Intel CPUs Can Lead to Spurious Numerical Failures

Simcenter STAR-CCM+ finite element solvers and some meshing modules depend on the Intel Math Kernel Library (MKL) for performance-critical linear algebra subroutines. The AVX-512 optimizations inside the MKL library can be too aggressive and cause the linear system solution process to fail even for a valid input.

If your system has an AVX-512 capable Intel CPU and the solver fails to produce a result due to a floating point exception, you can try setting the environment variable `MKL_ENABLE_INSTRUCTIONS` to a value of `AVX2`. This setting can help to stabilize the system. For example:

- Bash shell: `export MKL_ENABLE_INSTRUCTIONS=AVX2`
- C shell (csh or tcsh): `setenv MKL_ENABLE_INSTRUCTIONS AVX2`

This setting configures the MKL library to avoid optimizations that are only appropriate for architectures more recent than Intel AVX2. For more details, see https://software.intel.com/en-us/mkl-linux-developer-guide-instruction-set-specific-dispatching-on-intel-architectures.

Hyperthreading Should be Disabled on Systems Running Simcenter STAR-CCM+

Siemens Digital Industries Software currently recommends that you disable hyperthreading on systems that will be used to run Simcenter STAR-CCM+. For front-end nodes running only Simcenter STAR-CCM+ clients, hyperthreading is not expected to have any adverse effects.

Simcenter STAR-CCM+ May Not Run in Conjunction with Synergy

There are reports of Simcenter STAR-CCM+ failing to launch on platforms that use Synergy to share a mouse and keyboard between platforms. This is due to an open bug in the Java JDK, as reported on the JDK Bug System: https://bugs.openjdk.java.net/browse/JDK-6322854.

XWindows Can Cause Problems

If you use XWindows software, especially on Windows, to "display" a Simcenter STAR-CCM+ client back to the local machine from a remote machine, various problems may occur, such as the remote client not starting correctly or at all. This method of working is not supported by Simcenter STAR-CCM+. You must run the client directly on your local machine and connect to a remote Simcenter STAR-CCM+ server.

Zero-Sized Files in Some NFS Systems

In some newer NFS systems, if the disk becomes full while you are saving a simulation file, a zero-sized simulation file is written to the disk. No error message appears.

Issues Relevant to Linux

This section contains a list of known issues that affect Simcenter STAR-CCM+ on Linux operating systems.

Graphics Drivers for AMD GPUs on Ubuntu and SUSE Require Modified Installation New

When running AMD GPUs on Ubuntu or SUSE Linux, Simcenter STAR-CCM+ may fail to use the GPU for rendering scenes and plots. When this failure occurs, Simcenter STAR-CCM+ falls back to using Mesa OpenGL, showing an exclamation mark next to the **Scenes** manager node in the simulation tree.

To remedy this issue, IT administrators must modify the Simcenter STAR-CCM+ installation manually as follows:

1. Create a backup copy of all files in `star/lib/linux-x86_64-2.28/system`, which thus far have been associated with this issue.
2. After creating the backup copy, delete all files `libstdc++.so*` from `star/lib/linux-x86_64-2.28/system/clang17.0-64/`.

Currently a comprehensive list of specific versions of the affected Linux operating systems, AMD GPU models, or AMD graphics drivers (open source and proprietary ones) is not available.

Alma and RedHat Linux are not affected, and neither are Nvidia GPUs if and only if they are using the proprietary graphics driver provided by Nvidia.

It is likely that the open-source drivers for Nvidia GPUs might be affected.

Any impact of this remedy on simulation results is unlikely, but cannot be ruled out.

If you have any questions, contact your Simcenter customer support representative.

Backspace Key Not Correctly Interpreted in SIP Installer in Console Mode on Linux New

To work with the Siemens Install Program (SIP) in console mode on Linux, you must first configure the backspace functionality so that it works as expected.

Since cursor and keypad keys do not work, ensure the chosen Linux terminal is configured to send `^H` as the equivalent of the backspace key.

Compatibility Issue with AMD CPUs Based on Zen 3 Microarchitecture

Compatibility issues have been found between the AMD CPUs based on the Zen 3 microarchitecture, such as the AMD EPYC Milan CPU family, and the currently supported version of the OpenSWR Mesa driver. If you are using this type of CPU, you are advised to launch Simcenter STAR-CCM+ with the argument `-graphics mesa` (at the cost of graphics performance).

UCX 1.8.0 with Special User-Defined Settings Can Lead to Silent Data Corruption

UCX version 1.8.0 has a bug that may cause data corruption when the TCP transport is used in conjunction with the shared memory transport. In Simcenter STAR-CCM+ with default settings, UCX 1.8.0 is only used in parallel runs on Mellanox InfiniBand systems predating ConnectX-4 (see Client-Server Setup > Working With Parallel Servers > Supported MPI Implementations > Using UCX in the Simcenter STAR-CCM+ User Guide), so this issue may only occur when special user settings are applied to force the use of UCX 1.8.0 with the affected transports.

During simulation startup, an attempt is made to detect user settings potentially triggering this bug. When Simcenter STAR-CCM+ does detect such settings, it generates a warning in the Output window.

Libraries Required with Simcenter STAR-CCM+ Client for NX on Linux

To run Simcenter STAR-CCM+ Client for NX on Linux, supported versions of NX must be accompanied by the installation of the following runtime libraries:

- `libGLU.so.1`
- `libXm.so.4`

Without these libraries, an error message appears when an attempt is made to update the geometry.

Latest Workspace Fonts May Require Anti-Aliasing

On some Linux systems, the latest Simcenter STAR-CCM+ workspace fonts have had issues such as blurriness. The workaround is to activate font anti-aliasing in your operating system settings.

The following example is a workaround for activating anti-aliasing in KDE. It is offered only as an example for a particular operating system. For instructions on your operating system, refer to its user documentation.

1. Launch **KDE settings**.
2. Under **Look & Feel**, click **Appearance**.
3. Navigate to **Fonts**.
4. Next to **Use Anti-Aliasing**, choose **Enabled** from the drop-down box.

Line Integral Convolution Does Not Work Properly with Intel Graphics Chipsets on Linux

Vector scenes that are set to display Line Integral Convolution (LIC) do not render properly on Intel graphics chipsets. This is due to issues with the Intel graphics driver. As a result, LIC is disabled on Intel graphics chipsets on Linux.

lmutil: "command not found" Error

On Linux platforms not conforming to the minimum LSB 3.0 (Linux Standard Base) requirement, a *command not found* error may appear when attempting to launch lmutil for the FLEXlm licensing. If this occurs, you must upgrade to LSB 3.0 or higher.

Shared Memory Limits Too Low

Linux workstations are often configured with low limits on the amount of allowable shared memory. This restricts how much memory can be pinned by the libraries that MPI uses. These libraries can print warning messages even when only using a single host and they usually indicate the limits are set too low-even if the library isn't being used. Some example error messages are displayed below:

- Open MPI:

  ```
  The OpenIB BTL failed to initialize while trying to allocate some locked
  memory.
  This typically can indicate that the memlock limits are set too low.
  For most HPC installations, the memlock limits should be set to
  "unlimited".

  The failure occurred here:

  Host: compute_node.example.com
  OMPI source: btl_opebib.c:114
  Function: ibv_create_cq()
  Device: Out of memory
  Memlock limit: 32767
  ```

  The Open MPI Frequently Asked Questions describe how the limits are changed. See the answer to How can a system administrator (or user) change locked memory limits?.

To resolve these types of issues, set workstations to have high (or preferably unlimited) limits.

Simcenter STAR-CCM+ Viewer Fails to Run If Required Libraries Are Not Found

In the current release, Simcenter STAR-CCM+ Viewer requires the following libraries:

- `xkbcommon` and `xkbcommon-x11`—these are standard system libraries that are typically already installed.
- GNU C library version 2.12 or greater
- GIMP Toolkit (GTK+) version 2.20 or greater

If Simcenter STAR-CCM+ Viewer cannot detect these versions, it generates an error message.

If you have these versions installed on your machine and you still get this error, it may be that your `xkbcommon` and GTK+ libraries are installed in a location other than the global packages location. Simcenter STAR-CCM+ Viewer expects to find these libraries in the global packages location, typically `/usr`.

If you installed GTK+ version 2.20 or greater in a different location:

- Add the path to your `pkgconfig` directory to the `PKG_CONFIG_PATH` variable. An example bash shell command is shown below:

  ```
  % export PKG_CONFIG_PATH=[GTK+_INSTALL_DIR]/lib/pkgxonfig:$PKG_CONFIG_PATH
  ```

- Add the path to your `lib` directory to the `LD_LIBRARY_PATH` variable. An example bash shell command is shown below:

  ```
  % export LD_LIBRARY_PATH=[GTK+_INSTALL_DIR]/lib:$LD_LIBRARY_PATH
  ```

Similarly, if you installed the `xkbcommon` libraries in a different location, add the path to your `lib` directory to the `LD_LIBRARY_PATH` variable. An example bash shell command is shown below:

```
% export LD_LIBRARY_PATH=[XKBCOMMON_INSTALL_PATH]/lib:$LD_LIBRARY_PATH
```

Issues Relevant to Windows

This section contains a list of known issues that affect Simcenter STAR-CCM+ on Windows operating systems.

FlatLaf Issue Causes UI Exception with Toolbar Drop-Downs

Due to an issue with FlatLaf, the third-party code that underlies part of the Simcenter STAR-CCM+ user interface, a toolbar drop-down feature can lead to errors. When the mouse pointer hovers over the drop-down arrow that accesses obscured toolbar icons, an exception occurs.

This issue is expected to be fixed in the near future. Until then, it is recommended either to widen the window so the icons are all displayed, or to customize your toolbar settings to remove lesser-used icons or toolbars.

Windows Update KB4598291 Required for Users of Windows 10 Versions 2004 and 20H2

Microsoft has made available a patch, KB4598291, to fix an error in Windows 10 Versions 2004 and 20H2. For reliable use on Windows of Simcenter STAR-CCM+, especially in parallel, you are advised to make sure your system includes this fix.

For details, see the page on Microsoft's Support site.

Some Scene/Plot Exports Fail on Windows When Output Points to Linux Network Folder

When using Simcenter STAR-CCM+ on Windows, if you attempt to export certain data from a scene (hardcopy image) or a plot (hardcopy image or `.csv` file) to a location on a Linux host that is mapped to your Windows drive via Samba sharing, Simcenter STAR-CCM+ generates a message that the selected location is "not writable". This occurs even when you have full write permission on the Samba drive.

In this situation, it is recommended that you export such files to your local Windows drive.

Exiting Some Screenshot Tools Causes Simcenter STAR-CCM+ Client Exception

When you take screenshots with software such as the Windows 7 Snipping Tool or SnagIt, the Simcenter STAR-CCM+ client may undergo a fatal error after you exit the screenshot tool. Such an error can also occur when you reactivate Simcenter STAR-CCM+ after exiting the screenshot tool.

To prevent this error, do one of the following:

- Manually activate an application other than Simcenter STAR-CCM+ before closing the screenshot tool. You can then switch to Simcenter STAR-CCM+ from the third application without causing the fatal error.
- Minimize the screenshot tool but leave it running.

Context-Sensitive Help Not Compatible with Microsoft Edge

When using Microsoft Edge as the default browser, help pages do not open at the correct location when you press `F1` for a selected node in the simulation tree. To avoid this issue, use an alternative browser such as Firefox or Google Chrome.

Internet Explorer May Block Access to the Help System

When using Internet Explorer to access the User Guide, you may see the following message:

```
To help protect your security, Internet Explorer has restricted this file from
showing active content that could access your computer.
```

You can then click for the option to **Allow Blocked Content**, which will then produce a Security Warning that says:

```
Allowing active content such as script and ActiveX controls can be useful, but
active content might also harm your computer.
Are you sure you want to let this file run active content?
```

To allow this content to run without getting blocked please follow these steps:

1. Open Internet Explorer.
2. Go to the **Tools** > **Internet Options** > **Advanced** tab.
3. Scroll down to the section labeled *Security*.
4. Activate the **Allow active content to run in files on My Computer** option.
5. Click **OK** and then close the *Internet Options* window.

Warnings About Network Access

If you have a personal firewall (for example, Norton Internet Services) that is set up to warn you about network access from your computer, you may get warnings about an IP address being accessed on port `47827`. This is caused by the session locator sending a multicast query looking for Simcenter STAR-CCM+ servers on your local network.

When the client is started without a specified simulation file (the default when Simcenter STAR-CCM+ is started via the **Start** > **[programs menu]** > **Siemens Simcenter STAR-CCM+** > **Simcenter STAR-CCM+ [version number] [(build number)]** menu on Windows 10), the session locator is started (in case you are attempting to connect to a running server). If you then open a simulation file or connect to a running server, the session locator stops. It restarts if you go to the *Servers* tab in the Simcenter STAR-CCM+ explorer window.

Open that port to prevent the warning, or if you are running from the command line, the `-loc` argument prevents the session locator starting.

Issues Relevant to the CAD Clients

This section contains known issues that affect the CAD Clients.

Simcenter STAR-CCM+ Installer Chooses to Install NX Components Even Though NX is not Installed

On a machine where NX has been installed and subsequently removed, the Simcenter STAR-CCM+ installer may choose to install the NX components even though the CAD software is no longer present. This is due to the NX uninstaller not removing all relevant information from the Windows registry.

Credits

Simcenter STAR-CCM+ makes use of several third party software components to provide certain features within its code.

For details about the licensing of these components, refer to the file `ReadMe_OSS.html` which is included in the root installation directory of Simcenter STAR-CCM+: 20.06.###/STAR-CCM+20.06.###.

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