Systema-Thermica

October 2024 Updates

DEFENCE AND SPACE

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Agenda

- Systema 4.9.2P2 Overview
- Systema 4.9.4 Overview
- What’s Next
- Conclusion

Systema

Systema-4.9.2P2

Overview

Systema - Thermica LTS 4.9.2P2 April. 2024:

Systema-4.9.2P2 is the **maintenance version** of the last Long Term Support (LTS) version.

Several bugfixes including:

- A new dialog is used to select files to avoid slowdowns on Windows
- Enabled to keep the link between the model and the material when renaming a material
- Trajectory: "Relative time" kind of date used in Time-Position-Velocity arcs fixed
- Mission: Fixes the event references when opening older versions

Thermica/Thermisol:

- Fixed a bug in the calculation of surface contacts in a model containing moving bodies.
- Fixed a bug where changing the absorptivity value had an impact on Earth IR absorbed power.
- The limit on the number of Surface Contacts that can be applied to the same node has been raised from 10 to 100
- Fixed a memory issue causing calculation to fail when using lots of sub-models.

All these fixes are also included in Systema-4.9.4

KEY MESSAGE
Do not hesitate to send us some feedbacks !

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Systema

Systema-4.9.4 Overview

Systema - Thermica 4.9.4 Sept. 2024:

Key Highlights:

New Long-Term Support (LTS) Version

Systema 4.9.4 replaces 4.9.2 as the new LTS version.

Platform Support

Now supports RedHat 8.10.

Enhanced Usability

New interface options

Python API improvements

Thermica Improvements

Introduction of a new Emission Source module.

Major improvements in specific items, planet fluxes and solar flux modules.

Bug fixes and performance optimizations across multiple modules.

DID YOU KNOW ?

In the “doc” directory of Systema installation folder you can find the release notes and know everything about the new versions ! You can also find them on our website !

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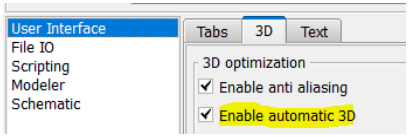
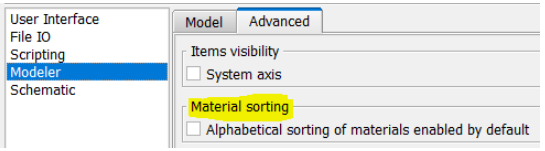
Systema

Systema-4.9.4



Modeler Enhancements:

New setting to disable automatic 3D opening on file creation.
New option to sort materials alphabetically (right-click menu & default setting).
Added scrollbar for discrete scales in 3D views
Various fixes and enhanced meshing error reporting.



Python API Enhancements:

New capabilities to manipulate meshing elements and parameters via API.
Fixes for date conversion, application freezing, and undo/redo functionality after script execution.

Trajectory and Mission Enhancements:

New inertial frame: True Equator of Date for arcs around Earth (instead of Veis1950 before), increasing accuracy for ascending node definitions. Note: Minor discrepancies on longitude may appear when loading older trajectory files.
Added Sun by default in Trajectory for improved visualization.
Fixed event references when opening older versions and anomaly step computations in Mission.

Other Key Updates:

Resolved issues with surface contacts and polygon cutters in models containing moving bodies.
Improved ray-tracing performance in specific scenarios.
Enhanced precision of re-emission rates for Quasi Monte-Carlo methods.
Improved handling of thermostat definitions in non-geometrical nodes

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Systema-4.9.4

File Compatibility:

Exports compatible files from Systema 4.9.2 (previous LTS).

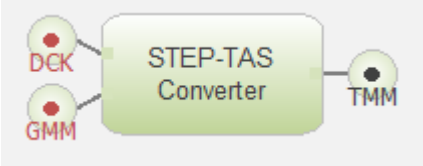
Fixed syntax issues during DCK to ESATAN conversions.

Improved STEP-TAS export for better ratio handling.

New TMM export functionality in STEP-TAS.
A part of the thermal mathematical model (TMM) can be exported with the geometrical model into a STEP-TAS file.
The exported data are:

- Node properties (node name, capacitance, internal dissipation, initial temperature)
- Radiative couplings
- Conductive couplings

In order to proceed, this converter needs two input parameters being the GMM (geometrical model in STEP-TAS format) and the Thermisol mathematical model (DCK file).



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Systema-4.9.4

Specific Items

Surface Contact Ray Tracing Optimization:

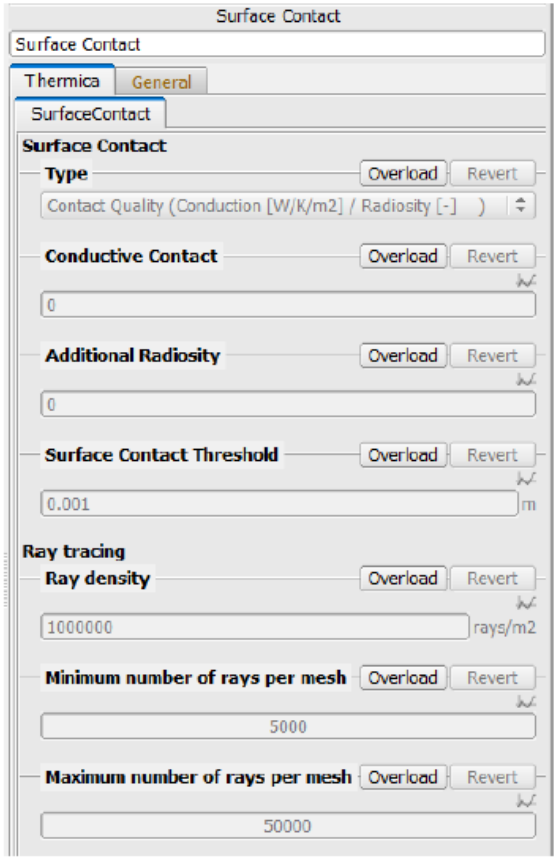
New option to adjust the number of rays fired per mesh based on ray density and mesh area. Previous versions used a fixed 50 rays per mesh; now it's customizable, with user-defined minimum and maximum values.

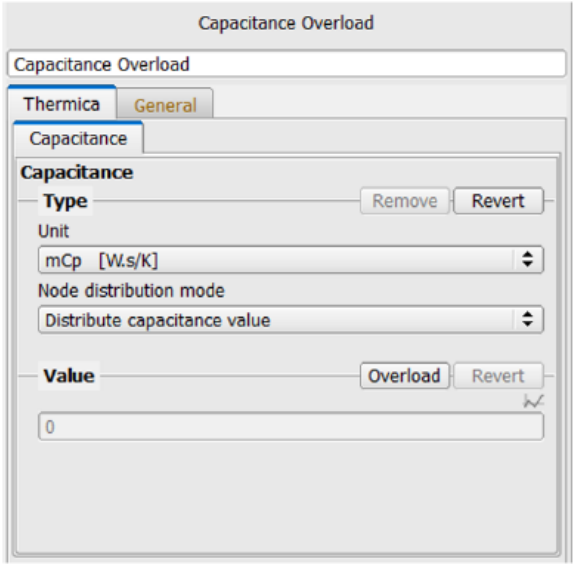
Raised limit of Surface Contacts per node from 10 to 100.

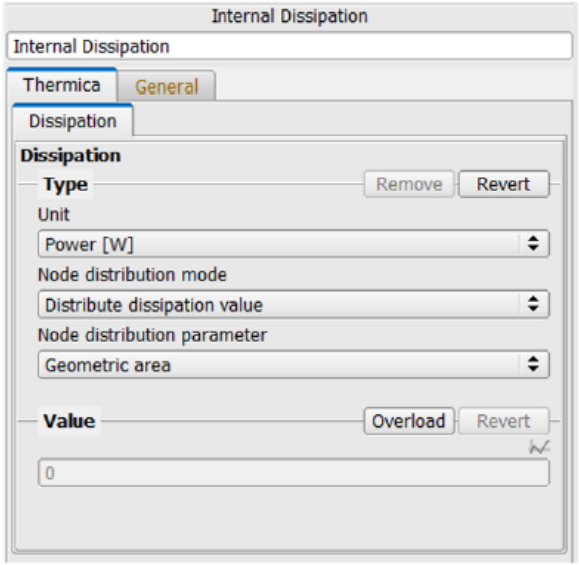
Capacitance and Internal Dissipation Improvements:

Ability to distribute values of capacitance overload and internal dissipation across all selected nodes instead of duplicating it.

For capacitance overload, the value is always distributed in proportion to node geometric area. For dissipation, distribution can be based on geometric area or capacitance.







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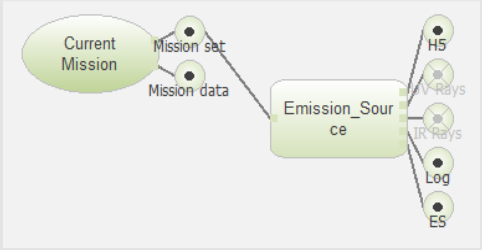
Systema-4.9.4

Emission source module

New

New module

New **Processing** module.



Features

Accurate modeling of **UV/IR fluxes** for satellite testing.

Replaces the older **Solar Lamp** specific item, offering more functionality.

Supports multiple lamp simulations and dual emission (UV & IR).

Ray tracing using Lambert's law or normal direction, with 3D visualization.

Time-dependent flux support and flexible data storage formats (.nwk, .h5).

Comparison to Solar Lamp Specific Item

	Solar Lamp Specific item	Emission source module
Multiple lamp simulation	Not supported ✗	Supported ✓
Dual emission capability (UV & IR)	Either UV or IR	UV, IR or both UV and IR simultaneously
Parametric flux definition	Not available ✗	Available in .nwk file ✓
Versatile ray tracing	Ray emission in normal direction only	Ray emission in all directions (Lambert's law) or normal direction
3D ray visualization	Not available ✗	Supported ✓
Data Storage	Fluxes in nwk file	Fluxes in nwk file, fluxes and couplings in h5 file
Time-Dependent emitted flux (user input)	Not available ✗	Supported (only in the .nwk output, not in the emi.h5 file) ✓

Systema

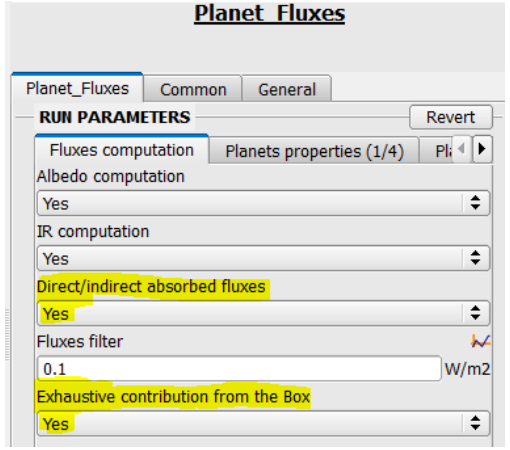
Systema-4.9.4

Planet Fluxes and Solar Flux Enhancements

Planet Fluxes New Features:

Export of direct and indirect absorbed fluxes (albedo and infrared fluxes) now supported in the H5 file.
Calculation of direct/indirect planet fluxes dependent on the albedo and IR computation being enabled.

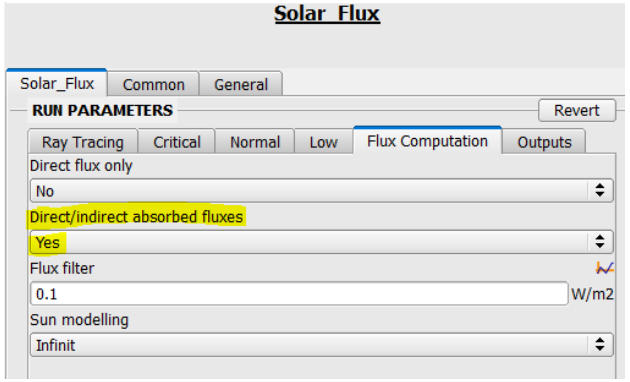
New option to improve faraway planet flux computation by filtering non-contributing flux directions.

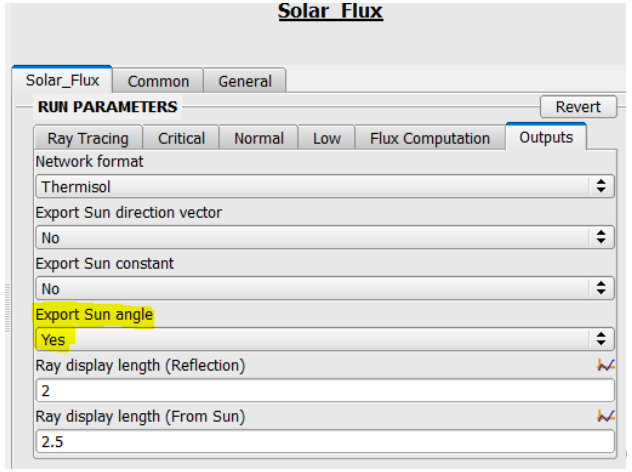


Solar Flux New Features:

Export direct and indirect absorbed solar fluxes to the .h5 file.

New option to export the Sun angle (angle between the node normal and the Sun direction vector) to the .nwk file.
Sun angle will be stored in arrays labeled SANGXXX for each node.
Sun angle can be used in transient computations performed by the Thermisol solver.





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What's next ?

5.0

Previous activities

- Definition and specifications
- Redesign of our development environment with more modern and more efficient technologies

- Software architecture definition

Developments started early October !

- New User Interface is drafted
- Focusing on creating a more efficient modeler to significantly reduce both the time and the cost associated with model definition.
- Improve flexibility through design process by enabling efficient parametric analyses, allowing users to quickly adapt to design changes, and making it easier to rerun calculations with different parameters.
- Enhance result comparison and analysis, providing more intuitive tools for comparing different simulation outcomes, making it easier to assess variations and draw insights from the data.

4.9.4P1

- Maintenance version of the current **Long Term Support** (LTS) version
- On user demand if blocking issue
- Scope will be defined according to your needs and feedbacks

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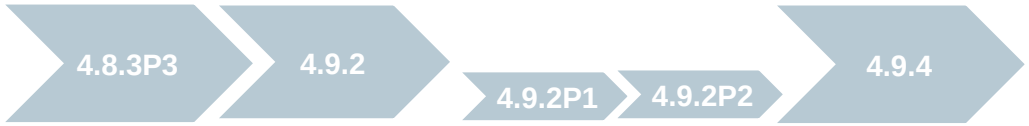
Conclusion



Systema-4.9.2P2 maintenance Version was released in April 2024

- Systema-4.9.2P2 was the maintenance version of the previous Long Term Support (LTS) version.

Systema-4.9.4 has been released on September 30th

- New Long-Term Support (LTS) Version
- **Systema-4.9.4 replaces Systema-4.9.2 as the new LTS version**.
- The Emission Source module brings substantial improvements for satellite testing simulations.
- Enhancements across various modules (surface contact, planet, and solar flux).
- Numerous bug fixes and optimizations improve overall usability and precision.

Systema-5.0 developments started early October

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