DEFENCE AND SPACE

Systema-Thermica
European Space Thermal Engineering Workshop 2020

Presenters: *D. Cayrol-Midan – M. Lepilliez*
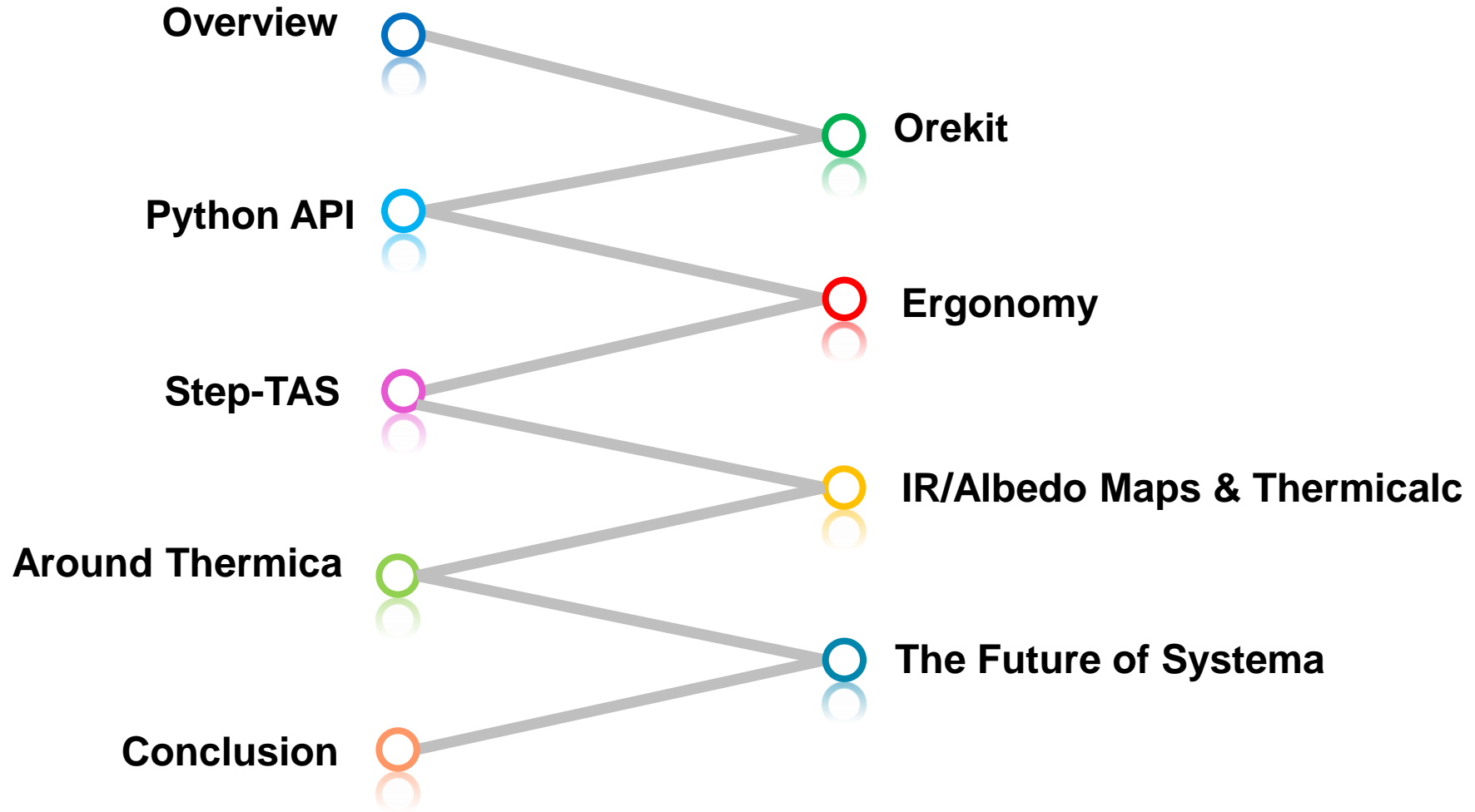Contributors: *G. Capblancq, L. Galeron, C. Bayeux*

6th-8th of October, 2020

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Agenda

Overview

Orekit

Python API

Ergonomy

Step-TAS

IR/Albedo Maps & Thermicalc

Around Thermica

The Future of Systema

Conclusion

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Overview

| 4.5.3b | 4.8.3P2 | 4.9.0 | … |

- **Systema 4.8.3 (last patch released on April 2020):**

  - Last Long Term Support version:
    - Adapted for users not wanting to switch version every year
    - The 4.8.3 version will be supported longer than the previous Short Term Support versions (v4.6.0, …, v4.8.2)
  - An improved Python scripting API with more interactivity and better performances
  - An optimized ergonomics using a settings profile system

- **Strong emphasis placed on validation and robustness :**

  - Consolidation focuses on:
    - The model exchanges (STEP-TAS/NASTRAN)
    - The specific items
    - The conduction and convection modules
  - Large campaign of bug fixing and validation
  - Addition of validation tests (unit and operational tests)
  - Documentation improved and more detailed
  - Limitations better documented

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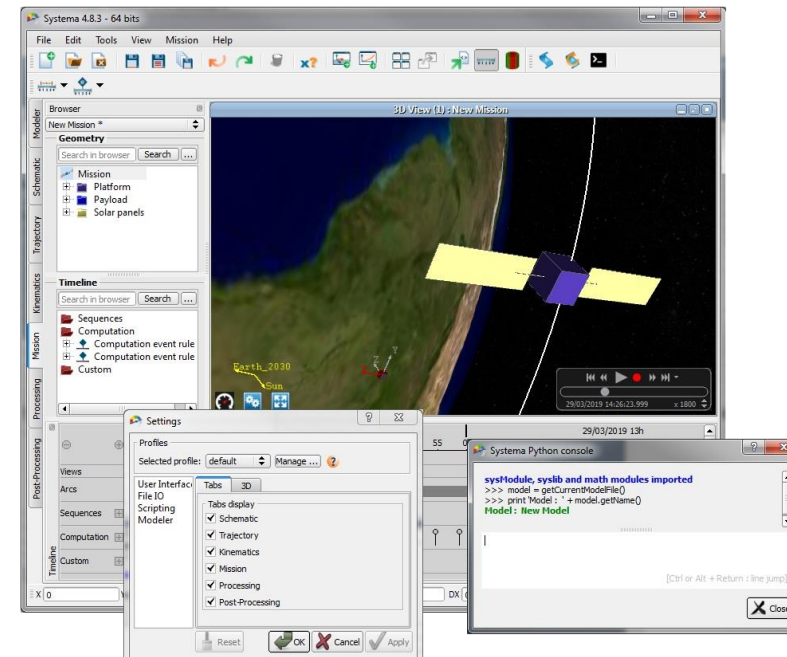
Overview

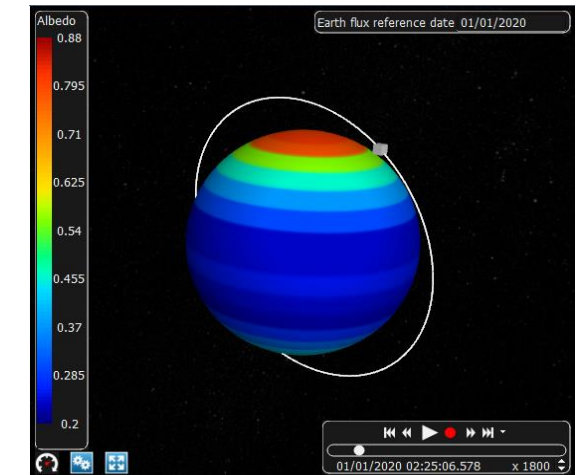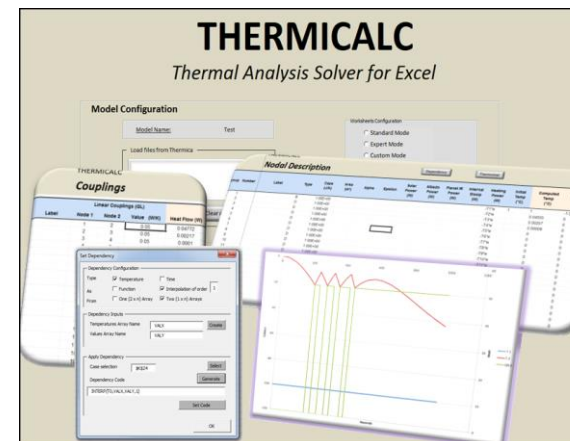| 4.5.3b	4.8.3P2	**4.9.0**	…

- **Systema - Thermica 4.9:**

  - Planet flux interactions : Albedo/IR Maps can be displayed on planet.
  - ThermiCalc : upcoming version before the year-end.

- **User Interface / Connecting with other softwares**

  - New trajectory library embedded : Orekit
  - New 3D ergonomic features
  - Improvement of the Python library

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Orekit

Systema 4.9.0 embeds the Orekit java library. Orekit is a reference flight dynamics library extensively and successfully used by many major actors in the space industry.
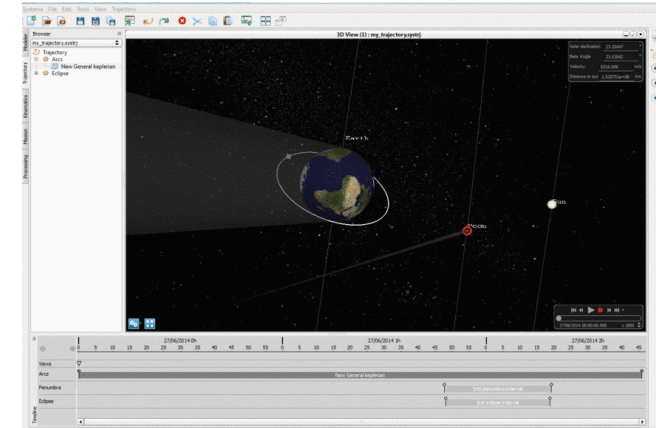
The Systema 4.9.0 trajectory module provides :
– More accurate computations

Eclipse_483_490_comparison.mp4

– Optimal data transfer from AOCS to analysis teams

Systema exposes a lot of Orekit methods thanks to the Python API
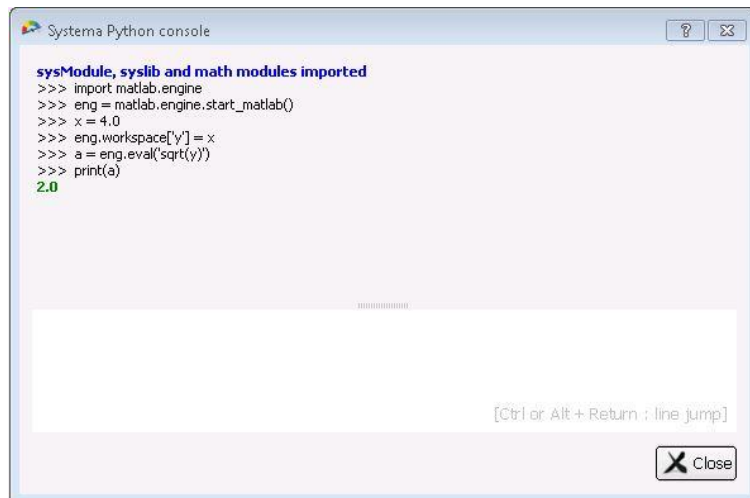
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Python API improvements

Since Systema 4.5, the Systema Python API has been continously improved as demonstrated in the last year ESTEW presentation.

In Systema 4.9.0, a big effort has been made to enrich the Python API to grant:
– The access to Orekit methods
– The management of any kind of kinematics laws
– The management of variables

The Python API provides now a very complete and powerfull way to :
– Add your own functionnalities to Systema and enrich the graphical user interface
– Integrate Systema to your own tools suite

Ergonomy

Systema 4.9.0 provides now a very powerful tool to enable quick and easy 3D manipulation.

Gizmo.mp4

This new tool called the gizmo :
– Can quickly be repositioned and reoriented for better control of the transformation.
– Let's you transform your current selection (shapes and objects)
– Provides a quick way to define the exact value of the angle of a rotation or the distance of translation
– Can take into account magnetism to easily align or snap model elements.

So with Systema 4.9.0, building a model becomes easier and more intuitive. There is no longer need to compute manually all the transformations!

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STEP-TAS

Within the framework of a joint work between ESA and our team, we had the opportunity to improve the STEP-TAS/Systema interface.

In Systema 4.9.0, there are now new features available such as :
– The validation check at import and export with dedicated error messages
– The support of new shapes such as antenna with focal
– The possibility to import and export irregular meshing
– And finally there is now an automatic fix of the coplanarity of exported quadrangles

Another part of the study, currently on-going, consists on a survey for users about the future evolutions of the STEP-TAS . We will probably contact you for this. Thank you in advance for your participation.

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Albedo/IR Maps

Albedo, IR and Temperature Maps now can be loaded in the trajectory tab of Systema to ensure the different values as an input.

They can also be exported from the Planet Flux computation, not for a perdiodic calendar but the values used for actual computation in order to display in the mission tab with the results.
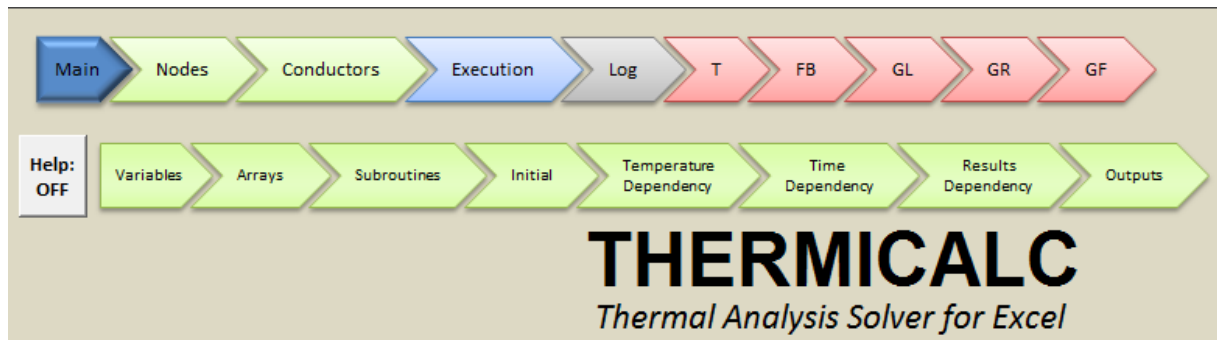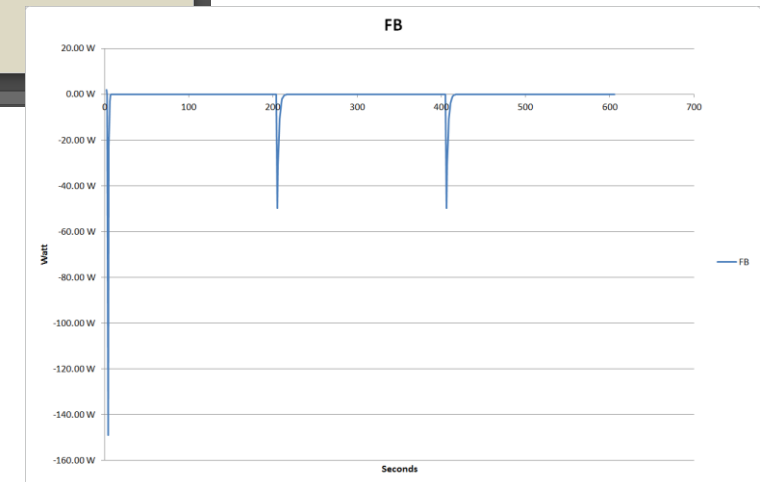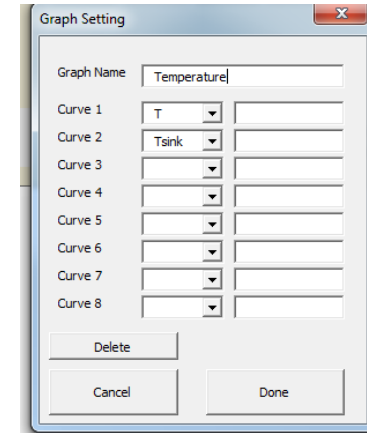
TO BE COMPLETED
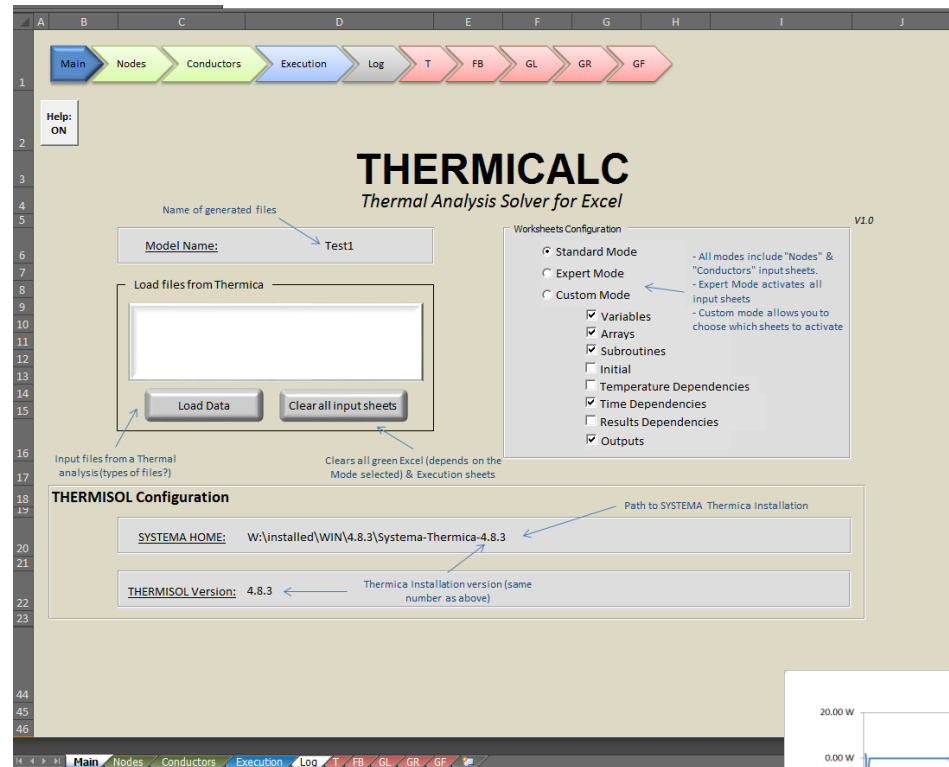**VIDEO**

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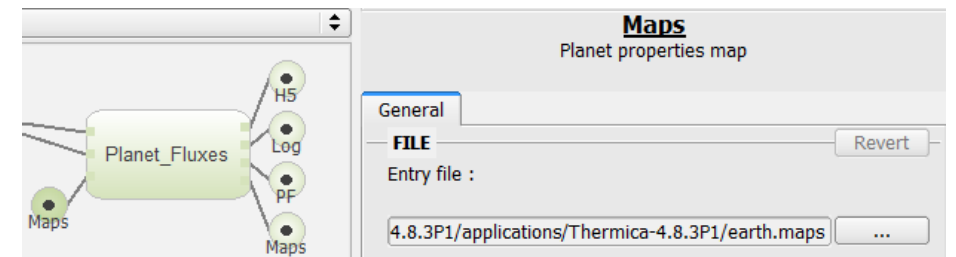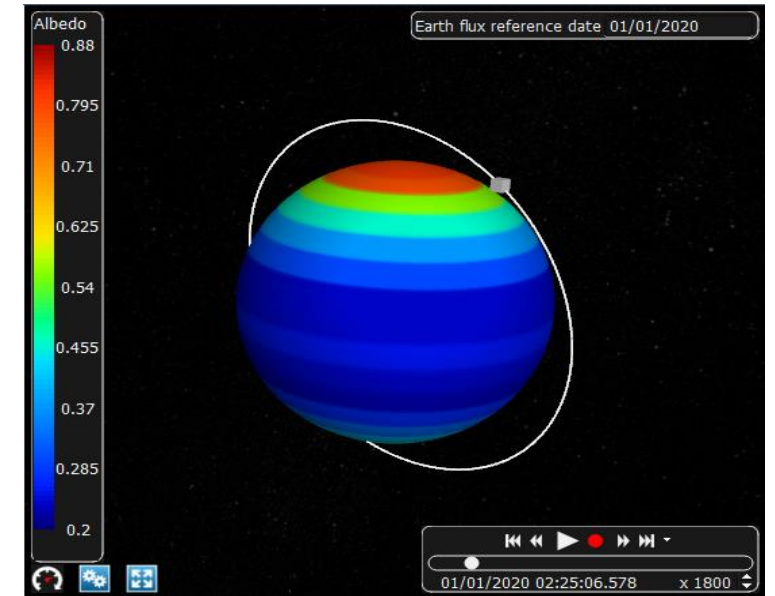
Thermicalc

Thermicalc is **:**

- a **Thermal Analysis Solver for Excel.**
- a preprocessing tool for Thermisol
- a postprocessing tool for Thermisol
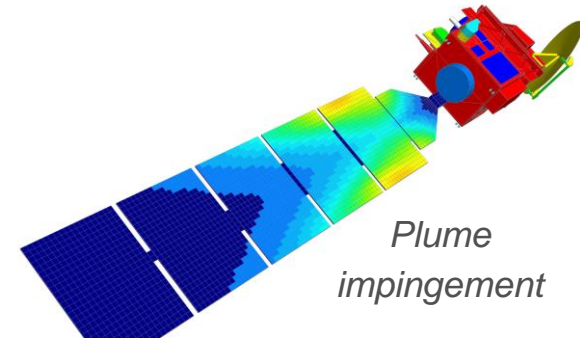
The new version embeds:
- a User Manual, accessible via Help buttons
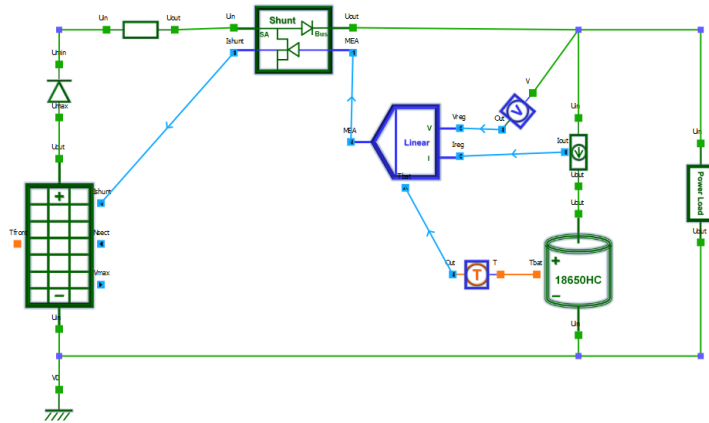- a user friendly interface

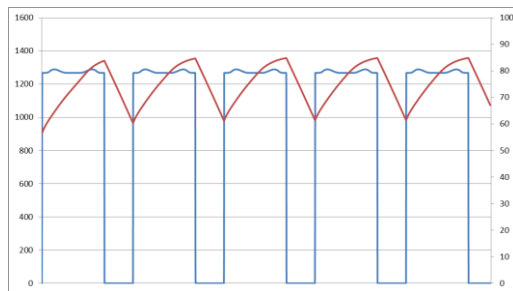# Thermica's Interaction with other Systema applications

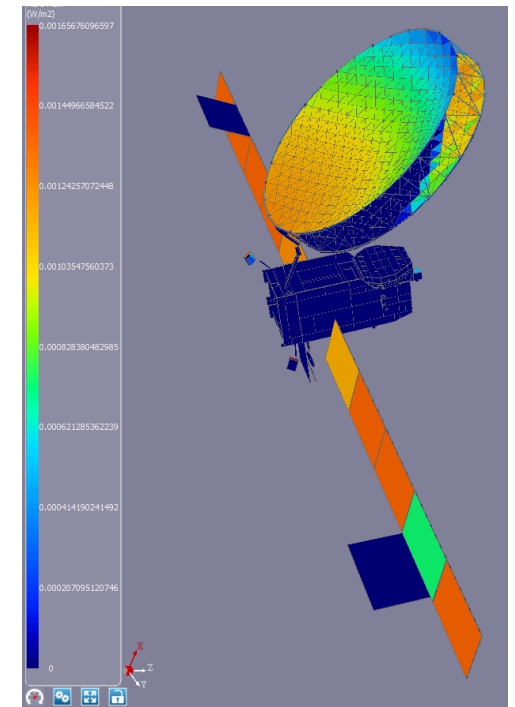- **Interactions with Thermica : Power, Plume & Perturbations**

Power schematic diagram
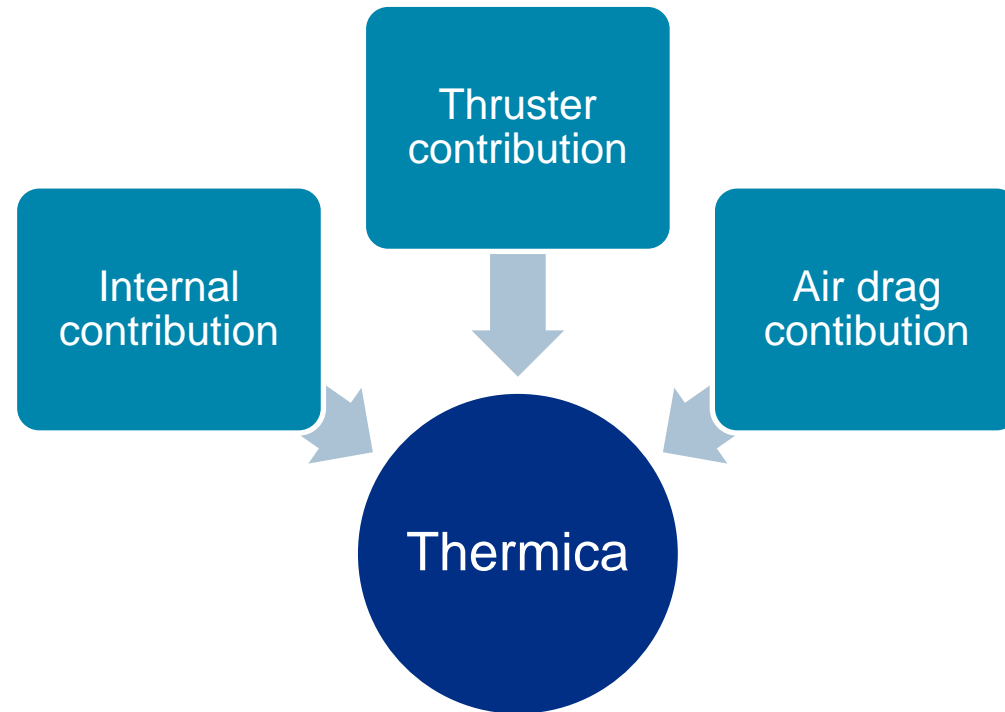

Solar flux (left scale) and battery charge (right scale)

Plume impingement

Thruster contribution

Internal contribution

Air drag contibution

Thermica

AirDrag

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A glimpse of the future of Systema

- **Systema 4.9.1:**
  - Thermica interaction with other applications:
    - Inside the satellite : Power
    - Outside the satellite : Plume & Perturbations.

- **Systema - Thermica 4.9.X:**
  - Conduction with cutters
  - Convection upgrade
  - Simplified LHP modeling

4.9.x
Application oriented

4.9.0

V5

Gather customers' needs → Developments → Validation & beta tests → Release

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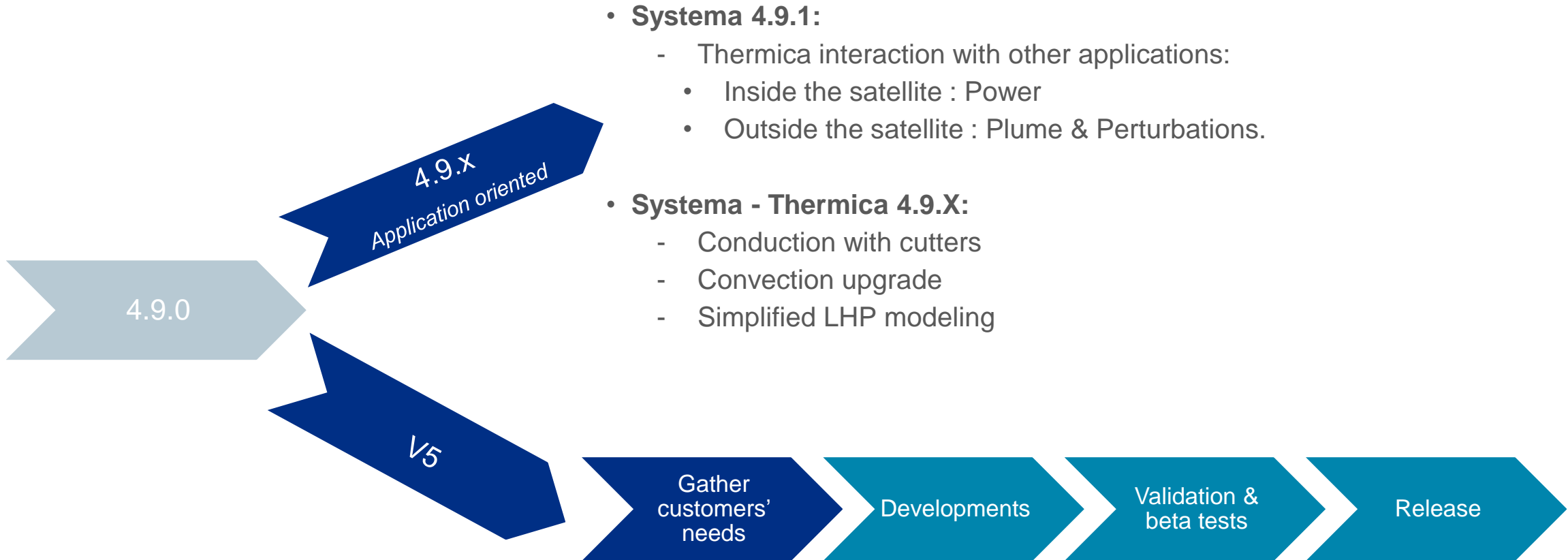
Conclusion

- **Systema 4.8.3 (last patch released on April 2020)** is the current Long Term Support version

- **Systema 4.9.0 is available** with many new features such as the Gizmo, Orekit,…

- Improved interface with the Step-TAS protocol.

- Watch out for ThermiCalc release in the upcoming months!

We are currently working on enhancing our website for exchange zones and forum, a LinkedIn page for regular updates and news, and online group trainings.

Systema
71 abonnés
15 h · Modifié · 🌐

We are pleased to annouce to our users that we will give a presentation of the last **#Systema #Thermica** improvements during the **#ESTEW** 2020 organized by **#ESA**. It will take place online from the 6th of Oct. to the 8th of Oct… voir plus

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👍 J'aime   💬 Commenter   ↪ Partager   ⬈ Envoyer

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Keep in touch

- Visit our website: www.systema.airbusdefenceandspace.com
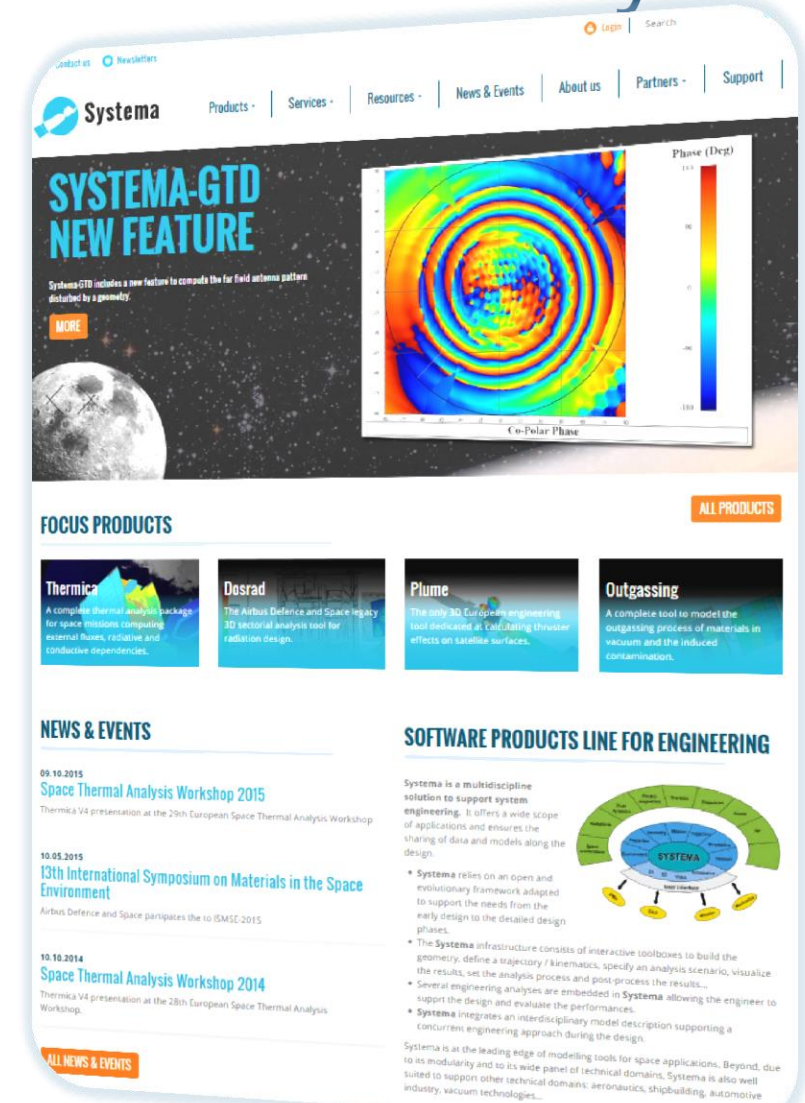

- Visit our linkedIn: www.linkedin.com/company/systema4

- Contact us by e-mail: engineering.software@airbus.com

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- Give us (anonymous) feedback: www.menti.com (code XX XX XX)

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Thanks for attention!

Give us (anonymous) feedback on: www.menti.com (code XX XX XX)

SYSTEMA-THERMICA

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