Julius-Maximilians-
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WÜRZBURG

MUΦX
Lehrstuhl X

Announcement

Seminar on Deformation Quantization and Geometry

6. 6. 2025 at 14:15

Seminarroom SE 31

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Geometry and behaviour of port-controlled models for thermodynamics

The port-controlled implicit dissipative Hamiltonian (port-Hamiltonian) systems are a class of models for open systems governed by a Hamiltonian (energy) function, which may be stored, dissipated or exchanged through external ports. They have found countless applications in mathematical modelling as well as in control engineering.

In thermodynamics, the dissipative phenomenon is not indeterminate, but due to the irreversible increase of entropy, which takes its place alongside the energy as governing quantity, so that port-Hamiltonian systems are not immediately suitable. In this talk, we present port-controlled implicit metriplectic systems as an adaptation of port-Hamiltonian systems to non-equilibrium thermodynamics.

In the first part of the talk, we shall briefly recall the definition of metriplectic systems as models of non-equilibrium thermodynamics, and define implicit metriplectic systems as an extension to systems with constraints.

In the second part, we take inspiration from port-Hamiltonian systems as prototype of port-controlled systems. The behaviour and geometric structure is demonstrated to be derived from implicit Hamiltonian systems defined on an extended state space. This observation is then applied to implicit metriplectic systems.

Invited by Madeleine Jotz