UNIVERSITÄT DUISBURG ESSEN

Offen im Denken

Theorie-Kolloquium SS 2022
Fr 29.04.2022, 14:00-15:30
Online (URL in E-Mail)

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Flux and storage of energy in nonequilibrium stationary states

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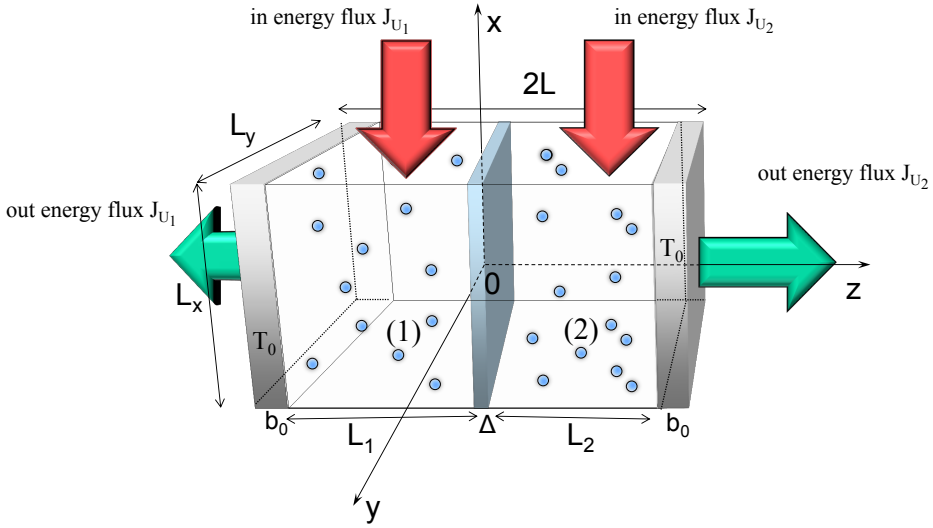

Systems out of equilibrium are notoriously difficult to describe in a single coherent methodology based on variational principles. I will present an approach to stationary states, based on two quantities: the energy stored in nonequilibrium states U, and the total energy flux in these states J_U. We proposed a methodology for the analysis of nonequilibrium states, based on internal constraints known from equilibrium thermodynamics. In order to illustrate this methodology, we studied two model systems: ideal gas and a Lennard-Jones fluid subjected to different modes of energy transfer. We discovered that when confined between two walls and divided by an inner, adiabatic, movable wall, these systems exhibit an out-of-equilibrium transition. We test our prediction on two competing states in the Rayleigh-Benard cell and for light-activated Janus colloids.

Phys. Rev. E **99**, 042118 (2019)
Phys. Rev. E **104**, 024102 (2021)
Phys. Rev. E **105**, 014123 (2022)