

Thermal fluctuations in Nonequilibrium Thermodynamics

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In this presentation we show how Nonequilibrium Thermodynamics is not only a theory of fluxes, but that it also yields a theory of fluctuations. The fluctuations theory is obtained by supplementing the dissipative fluxes with a random (thermal noise) component and by adopting a simple hypothesis for the thermal-noise correlations (fluctuation dissipation theorem). Using an incompressible fluid subjected to a temperature gradient as an example, one can show how fluctuating hydrodynamics can be used to calculate the fluctuations of macroscopically relevant quantities: temperature, pressure, etc. This method has the advantage of being readily extrapolable to study fluctuations around nonequilibrium steady states, leading to predictions that have been verified experimentally.