

Navier–stokes–fourier equations: a rational asymptotic modelling point of view

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Abstrak

This research monograph deals with a modeling theory of the system of Navier-stokes-fourier equations for a newtonian fluid governing a compressible viscous and heat conducting flows. The main objective is threefold. First , to 'deconstruct' this Navier-Stokes-Fourier system in order to unify the puzzle of the various partial simplified approximate models used in Newtonian Classical Fluid Dynamics and this, first facet, have obviously a challenging approach and a very important pedagogic impact on the university education. The second facet of the main objective is to outline a rational consistent asymptotic/mathematical theory of the of fluid flows modeling on the basis of a typical Navier-Stokes-Fourier initial and boundary value problem. The third facet is devoted to an illustration of our rational asymptotic/mathematical modeling theory for various technological and geophysical stiff problems from, aerodynamics, thermal and thermocapillary convections and also meteofluid dynamics.