FACOLTÀ DI SCIENZE MATEMATICHE, FISICHE E NATURALI
DIPARTIMENTO DI MATEMATICA E FISICA "NICCOLÒ TARTAGLIA"

Thermal convection in a generalized Navier-Stokes fluid

Inteviene
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Abstract

We discuss models for flow in a class of generalized Navier - Stokes equations. The work concentrates on producing models for thermal convection, analysing these in detail, and deriving critical Rayleigh and wave numbers for the onset of convective fluid motion.
In addition to linear instability theory we present a careful analysis of fully nonlinear stability theory. The theories analysed all possess a bi-Laplacian term in addition to the normal spatial derivative term. The theories discussed are Stokes couple stress theory, dipolar fluid theory, Green - Naghdi theory, Fried - Gurtin - Musesti theory, and a second theory of Fried and Gurtin.
We show that the Stokes couple stress theory and the Fried - Gurtin - Musesti theory involve the same partial differential equations while those of Green - Naghdi and dipolar theory are similar. However, we concentrate on boundary conditions which are crucial to understand all five theories and their differences.

Seminario

Mercoledì 7 dicembre 2022
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