Convective-radiation effects on thermal viscous incompressible flows

L. Consiglieri
Department of Mathematics and CMAF
Sciences Faculty, University of Lisbon, Portugal
lcconsiglieri@fc.ul.pt

Abstract

We investigate the nonlinear coupled system of elliptic partial differential equations which describes the fluid motion and the energy transfer. Due to the simultaneous action of the convective-radiation effects on a part of the boundary, such system leads to a boundary value problem. We present existence results of weak solutions under different constitutive laws for the Cauchy stress tensor with p-coercivity parameter satisfying $p > 3n/(n+2)$, in a n-dimensional space, and correlated heat flux [1, 2]. If the Joule effect is neglected in the energy equation, the existence result is stated for a broader class of fluids such that $p > 2n/(n+1)$, and related q-coercivity parameter to the heat flux [3].

Keywords: Non-Newtonian fluids, convective-radiative heat transfer, Joule effect, weak solution.

References

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