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RAYLEIGH–BÉNARD PROBLEM FOR THERMOMICROPOLAR FLUIDS

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Abstract. The two-dimensional Rayleigh–Bénard problem for a thermomicropolar fluids model is considered. The existence of suitable weak solutions which may not be unique, and the existence of the unique strong solution are proved. The global attractor for the m-semiflow associated with weak solutions and the global attractor for semiflow associated with strong solutions are shown to be equal.

1. Introduction

The theory of micropolar fluids is a generalization of the Navier–Stokes model in the sense that it takes into account the microstructure of the fluid. The theory is expected to provide a more realistic mathematical model for the non-Newtonian fluid behaviour observed in certain fluids such as polymers suspensions where polymer chains exhibit a complicated evolution. Colloidal fluids, liquid crystals, polymer suspensions in blood, ferro liquid or nanofluids are examples of applications where the micropolar fluid theory is used. It was introduced by Eringen in [14] and its mathematical analysis is presented in [22].

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