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Dedicated to Professor LAZĂR DRAGOȘ on his 75th birthday

Asymptotic thermal flow around a highly conductive suspension

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Abstract - Radiant spherical suspensions have an ε -periodic distribution in a three dimensional incompressible viscous fluid governed by the Stokes-Boussinesq system. We study the border case when the radius of the spheres is of order ε^3 and the ratio of the solid/fluid conductivities is converging to infinity when $\varepsilon \rightarrow 0$. We apply a homogenization procedure by adapting the energy method introduced by [1] and developed by [2]-[7]. The macroscopic behavior is described by a nonlocal law of Brinkman-Boussinesq type and two heat equations, where the radiation and a certain capacity of the vanishing suspensions appear. This result completes those obtained for the thermal flow through an ε -periodic solid matrix having a non-vanishing macroscopic porosity (see [8]-[9])

Key words and phrases : Stokes-Boussinesq system, homogenization, non local effects

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