

Abstract Submitted
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Convective filtration near solid inclusion in a fluid heated from above¹ TATYANA LYUBIMOVA, Institute of Continuous Media Mechanics UB RAS, Perm, Russia, DMITRIY LYUBIMOV, Perm State University, Perm, Russia — Convective filtration near a highly conductive cylindrical solid inclusion in porous medium saturated by a fluid is studied for the case of heating from above. Convective flow is absent far from inclusion and near inclusion conditions for the conductive state are not satisfied and convection arises. The study is performed in the framework of Darcy-Boussinesq approximation. Two-dimensional flow uniform along the cylinder axis is considered. We use Oseen-like approach where, however, quasi-linearization is applied to the nonlinear terms in the energy equation is not in the momentum. In the first approximation we obtain a system of linear equations with the Rayleigh number as a parameter. An asymptotic representation of solutions uniformly valid at all distances from the inclusion is obtained for small values of Rayleigh number. It is shown that convective flow at the distances from the inclusion larger than the inclusion size has the form of horizontal jets directed away from the body and slowly expanding with the increase of distance from the body. The compensational flow is not of the jet type. The case of finite thermal conductivity of the inclusion is studied in the framework of similar approach.

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