

# Permeability effect on centrifugal convection in a porous medium

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## 1 INTRODUCTION AND OBJECTIVE

The knowledge of centrifugal convection in a porous medium is essential for optimizing processes and systems in several fields, including oil recovery, chemical engineering, groundwater hydrology, geotechnical engineering, environmental engineering and space science. Almost all investigations carried out so far have assumed a constant medium permeability. Hence the effect of permeability variation on the onset of convection in a rotating fluid saturated porous medium is investigated.

## 2. RESULTS AND HIGHLIGHTS

The boundaries of the rotating porous medium are maintained isothermal and different. The fluid is incompressible and the flow through the medium is assumed to be governed by the Darcy law. Free convection as a result of the centrifugal body force alone is considered whereas the gravity is neglected. The Boussinesq approximation that takes care of linear density variation is employed. The medium permeability is assumed to vary linearly.

A stability analysis is performed on the quiescent equilibrium state. The analysis is linear and normal mode approach is used to arrive at an eigenvalue problem. An approximate solution is then obtained through a higher order Galerkin method. The influence of the governing parameters is obtained in terms of critical Rayleigh number and critical wavenumber. It is found that the permeability parameter can be chosen properly to either hasten or suppress the onset of convection.

## REFERENCES

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