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Dambaru Bhatta* (dambaru.bhatta@utrgv.edu) and **Daniel N Riahi**. *Weakly nonlinear convective flow in an aquifer with varying permeability and thermal conductivity in the vertical direction*. Preliminary report.

Here the problem of weakly nonlinear convective flow in a horizontal aquifer layer with horizontal isothermal and rigid boundaries is investigated. Such a layer can be treated as a porous layer, where Darcy's law holds, subjected to the conditions that the porous layer's permeability and the thermal conductivity are variable in the vertical direction. In this layer. In addition, this study is restricted to the case that the subsequent hydraulic resistivity and diffusivity have small rate of change with respect to the vertical variable. Assuming a motionless and vertically variable basic state, weakly nonlinear approach is applied to calculate the solutions for convective flow quantities such as vertical velocity and the temperature that arise as the Rayleigh number exceeds its critical value. Numerical results for those flow quantities for two-dimensional case are presented. (Received September 22, 2017)