

**The effect of the macroscopic local inertial term on the non-Newtonian fluid flow in channels filled with porous medium**

**Authors:** Al-Nimr, M.A., Aldoss, T.K.

**Abstract:** The transient hydrodynamics behavior of the non-Newtonian fluid flow in horizontal parallel-plate channels filled with porous medium is investigated numerically. The role of the macroscopic local inertial term in the porous domain momentum equation is studied. It is found that the macroscopic local inertial term has insignificant effect on the channel hydrodynamics behavior for all non-Newtonian fluids having power law index less than 0.5 and over the entire range of Darcy and Forchheimer numbers. However, the macroscopic local inertial term has significant effect when the power law index is greater than 1 over a wide range of Darcy and Forchheimer numbers especially for relatively high values of Darcy and low values of Forchheimer numbers. It is found that the effect of the macroscopic local inertial term is very sensitive to the Forchheimer number at high values of Darcy numbers and power law index. Also, there is an upper limit for  $n$  beyond which changing the power law index has insignificant effect on the local inertial term.