Heat and Mass Transfer of an Oscillating Flow in a Porous Channel with Chemical Reaction

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Abstract : A numerical study is made in a parallel-plate porous channel subjected to an oscillating flow and an exothermic chemical reaction on its walls. The flow field in the porous region is modeled by the Darcy–Brinkman–Forchheimer model and the finite volume method is used to solve the governing equations. The effects of the modified Frank-Kamenetskii (FKm) and Damköhler (Dm) numbers, the amplitude of oscillation (A), and the Strouhal number (St) are examined. The main results show an increase of heat and mass transfer rates with A and St, and their decrease with FKm and Dm.