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Modelling and simulation of natural convection in cavities with immersed internally heated porous structures[1] VICTORIA HAMTIAUX, MILTIADIS PAPALEXANDRIS, Universit catholique de Louvain — In this talk we are concerned with three-dimensional natural convection in domains that contain immersed porous structures heated internally. The formulation of the problem is based on the single-domain approach which incorporates porosity as a field variable. Also, the solid matrix is not in thermal equilibrium with the fluid inside the porous structure. A homogeneous boiling model is also implemented to take account of the phase change that may occur when water reaches the saturation temperature. The numerical scheme is based on a fractional-step time-marching scheme coupled with a projection method for the computation of the pressure. First, we present briefly the formulation of the mathematical model and describe the basic aspects of the proposed numerical algorithm. Then, we present and discuss numerical results from a series of test cases for the problem in hand. Emphasis is placed on the effect of thermal non-equilibrium between the solid matrix and the fluid inside the porous medium.

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