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Fluid-solid interaction in natural convection heat transfer in a square cavity with a perfectly thermal-conductive flexible diagonal partition
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Abstract
The unsteady natural convective heat transfer of an incompressible fluid is studied in a square cavity divided into two triangles using a flexible thermal conductive membrane. The temperature difference in the cavity induces buoyancy forces and natural convective flows. The membrane is adopted to be very flexible and thin, and hence, the interaction of the fluid and solid structure interaction (FSI) could change the shape of the membrane. An arbitrary Lagrangian-Eulerian (ALE) formulation associated with an unstructured grid is utilized to formulate the motion of the membrane. The solid and fluid governing equations are formulated and written in a non-dimensional form and the behavior of the membrane and the convective heat transfer of the cavity for various non-dimensional parameters are examined. The effects of the stiffness of the membrane and the fluid parameters on the shape of the membrane and the convective heat transfer in the cavity are studied. © 2016 Elsevier Ltd. All rights reserved.

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