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Mixed convection in lid-driven trapezoidal cavities with an aiding or opposing side wall
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Abstract
Mixed convection heat transfer and fluid flow fields inside a lid-driven trapezoidal cavity were studied numerically. The cavity horizontal walls were thermally insulated while the inclined side walls were maintained isothermally at different temperatures. Forced convection was induced by moving the hotter right inclined side wall. The problem is formulated using the stream function-vorticity procedure. Together with the established boundary conditions on the right moving wall, the problem is solved by the finite difference method. The Richardson number Ri (0.01-10) and inclination angle of the side walls Φ (66-80°) were considered as pertinent parameters and investigated in two lid-driven cases: aiding and opposing directions. The results show that the behavior of Nusselt number is different from Richardson number depending on the direction of the lid. The inclination angle of the side walls was found to have a significant effect on Nusselt number when Ri was relatively low (≤1); otherwise, a negligible effect of Φ on Nusselt number was recorded. Copyright © 2015 Taylor & Francis Group, LLC.

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