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Analysis of mixed convection and entropy generation of nanofluid filled triangular enclosure with a flexible sidewall under the influence of a rotating cylinder

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Abstract
In this study, mixed convection and entropy generation in a nanofluid filled triangular cavity under the influence of rotating cylinder and flexible sidewall were numerically analyzed with finite element method. The inclined sidewall was cooled while the left vertical wall is partially heated. Heat transfer rate enhances as the values of Rayleigh number, angular rotational velocity of the cylinder, elastic modulus of the flexible sidewall and solid nanoparticles volume fraction increase. Nusselt number enhances more in the counter-clockwise direction of the cylinder as compared to clockwise directional rotation and 13.55% of average heat transfer enhancement was achieved for Ω= 3000 when compared to motionless cylinder. Average Nusselt number increases by about 30.50% when the elastic modulus of the flexible wall is changed from 500 to 10 5 . The changes in the velocity profiles are significant for the lower part of the triangular enclosure with respect to changes in angular rotational velocity and elastic modulus as compared to upper part of the cavity. Adding nanoparticles increases heat transfer especially for the lower part of the cavity and 49.63% of heat transfer enhancement was achieved for the highest volume fraction when compared to base fluid. Normalized total entropy generation rates enhance for higher values of elastic modulus of the flexible wall, angular rotational speed of the circular cylinder and nanoparticle volume fractions. © 2018, Akadémiai Kiadó, Budapest, Hungary.

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