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Thermal analysis of an Eyring-Powell fluid flow through a constricted channel
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Abstract
This paper is aimed to investigate the entropy generation in a magnetohydrodynamic convective flow of Eyring-Powell fluid through a mildly constricted channel. The constriction is assumed to be of regular or irregular shape and is presented inside the channel wall. Mathematical model is developed using the basic laws of conservation of mass, momentum and energy. The governing equations are normalized using appropriate set of dimensionless variables and solutions are obtained by regular perturbation technique. The solutions are further used to calculate the entropy expression associated with the second-law of thermodynamics. The heat transfer characteristics, like, temperature, isotherms, entropy generation number entropy lines and the Bejan number are analyzed for the variation in magnetic field, shape parameter and material constants. It is observed that entropy production is maximum in the narrow part of the channel. Moreover, entropy generation rate is higher for the regular parabolic shape as compared to irregular shapes of constriction. © 2018 Serbian Society of Heat Transfer Engineers.

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