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Quasi-two-dimensional MHD duct flow around a 180-degree sharp bend in a strong magnetic field (Conference Paper)

Sapardi, A.M.[a,b], Hussam, W.K.[a], Pothérat, A.[c], Sheard, G.J.[a]

[a]Sheard Lab., Department of Mechanical and Aerospace Engineering, Monash University, VIC 3800, Australia
[b]Department of Mechanical Engineering, International Islamic University Malaysia, Kuala Lumpur, 53300, Malaysia
[c]Applied Mathematics Research Centre, Coventry University, Coventry, CV1 5FB, United Kingdom

Abstract

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This study considers the quasi-two-dimensional flow of an electrically conducting fluid subjected to a strong out-of-plane magnetic field in a rectangular duct. The effect of Hartmann number on flow features such as the length of the downstream recirculation bubbles and the threshold Reynolds numbers between steady-state and unsteady flow regimes for values of the ratio between the throat of the bend and the duct height, $\beta = 1$ are identified. The simulations reveal that the primary recirculation bubble length decreases with increasing Hartmann number, and simultaneously the secondary recirculation bubble is significantly damped compared to the corresponding non-MHD case. The critical Reynolds number where the transitions from steady to unsteady flow occurs was found to increase with increasing of Hartman number. This study provides information that will be useful for refining the design of heat exchanger ducting in MHD systems to maximise the useful mass transport adjacent to the duct walls where heating is applied.

SciVal Topic Prominence

Topic: Magnetohydrodynamics | Liquid metals | magnetohydrodynamic flow

Prominence percentile: 81.986

Indexed keywords

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