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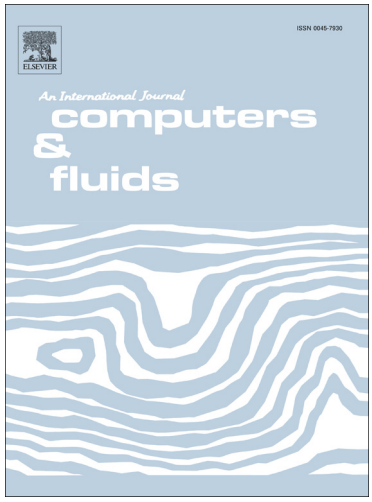

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An extension of AUFSR scheme for the ideal magnetohydrodynamics equations

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ABSTRACT

This paper presents an extension of AUFSR solver for the analysis of ideal magnetohydrodynamics (MHD) flows. The proposed approach is derived from the previous studies presented for solving Euler equations [1, 2]. The AUFSR scheme is obtained by combining two upwind numerical schemes: AUFS scheme and Roe scheme. The scheme introduces two artificial waves speeds and takes into account all MHD waves such as slow, fast, Alfven and entropy wave into the flux decomposition. The direction of wave propagation is adjusted by two waves speeds. Numerical tests in one and two-dimensions in ideal-MHD problems are given to show the efficiency and robustness of AUFSR solver for solving contact and rotational discontinuities, fast, slow and rarefaction shocks waves. Each of the pieces of the scheme is described, and the scheme is validated and its accuracy assessed

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