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*High Order Compact Mimetic Differences and Discrete Energy Decay in 2D Wave Motions*

Mimetic Difference Operators Div, Grad and Curl, have been constructed to provide a high order of accuracy in numerical schemes that mimic the properties of their corresponding continuum operators; hence they would be faithful to the physics. However; this faithfulness of the discrete basic operators might not be enough if the numerical difference scheme introduces some numerical energy increase, which would obviously result in a potentially unstable performance. We present a high order compact mimetic scheme for 2-D wave motions and show that the energy of the system is also conserved in the discrete sense.