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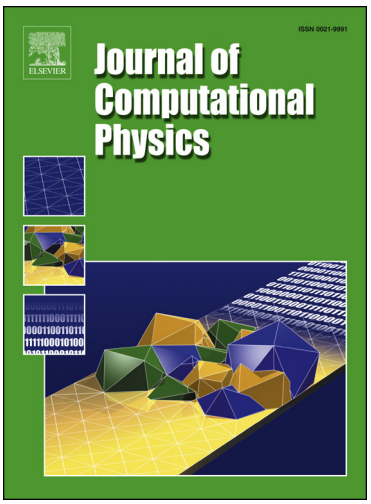

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An equatorially enhanced grid with smooth resolution distribution generated by a spring dynamics method

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Abstract

An equatorially enhanced grid is applicable to atmospheric general circulation simulations with better representations of the cumulus convection active in the tropics. This study improved the topology of previously proposed equatorially enhanced grids [LML grids; Iga 2015, J. Comput. Phys.], which had extremely large grid intervals around the poles. The proposed grids in this study are of a triangular mesh and are generated by a spring dynamics method with stretching around singular points, which are connected to five or seven neighboring grid points. The latitudinal distribution of resolution is nearly proportional to the combination of the map factors of the Mercator, Lambert conformal conic, and polar stereographic projections. The resolution contrast between the equator and pole is $2.3 \sim 4.5$ for the sampled cases, which is much smaller than that for the LML grids. This improvement requires only a small amount of additional grid resources, less than 11% of the total. The proposed grids are also examined with shallow water tests, and

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