The A3 Scheme a Fourth-Order Space-Time Flux-Conserving and Neutrally Stable Cese Solver

By Sin-Chung Chang

Bibliogov, United States, 2013. Paperback. Book Condition: New. 246 x 189 mm. Language: English . Brand New Book ***** Print on Demand *****.The CESE development is driven by a belief that a solver should (i) enforce conservation laws in both space and time, and (ii) be built from a non-dissipative (i.e., neutrally stable) core scheme so that the numerical dissipation can be controlled effectively. To initiate a systematic CESE development of high order schemes, in this paper we provide a thorough discussion on the structure, consistency, stability, phase error, and accuracy of a new 4th-order space-time flux-conserving and neutrally stable CESE solver of an 1D scalar advection equation. The space-time stencil of this two-level explicit scheme is formed by one point at the upper time level and three points at the lower time level. Because it is associated with three independent mesh variables (the numerical analogues of the dependent variable and its 1st-order and 2ndorder spatial derivatives, respectively) and three equations per mesh point, the new scheme is referred to as the a(3) scheme. Through the von Neumann analysis, it is shown that the a(3) scheme is stable if and only if the Courant number is less than 0.5. Moreover,...

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