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Stability Studies for Difference Equations: I Non-Linear Stability; II Coupled Sound and Heat Flow (Classic Reprint) (Hardback)

By R D Richtmyer

Forgotten Books, 2018. Hardback. Condition: New. Language: English . Brand New Book ***** Print on Demand *****.Excerpt from Stability Studies for Difference Equations: I Non-Linear Stability; II Coupled Sound and Heat Flow In part II, the difference equations for coupled sound and heat flow, in which the latter is treated implicitly, are considered. The stability condition is known to be $c \Delta t / \Delta x \leq 1$, where c is the isothermal sound speed. This seems somewhat paradoxical, for if the thermal conductivity is small, signals travel at practically the adiabatic sound speed c_0 , which is larger than c . For such problems, stability, as usually defined, is inadequate for an actual calculation, since it considers only the limit $\Delta t, \Delta x \rightarrow 0$. A practical stability criterion for such problems is proposed and is applied to the problem at hand, with complete success, as judged by numerical tests, which are also described; the criterion leads, in this problem, to a stability condition intermediate between $c \Delta t / \Delta x \leq 1$ and $c_0 \Delta t / \Delta x \leq 1$, depending on various parameters, including Δt (or Δx) itself. The condition is shown to be necessary (by the Fourier analysis) and sufficient (by the energy method). About the Publisher Forgotten Books publishes...


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