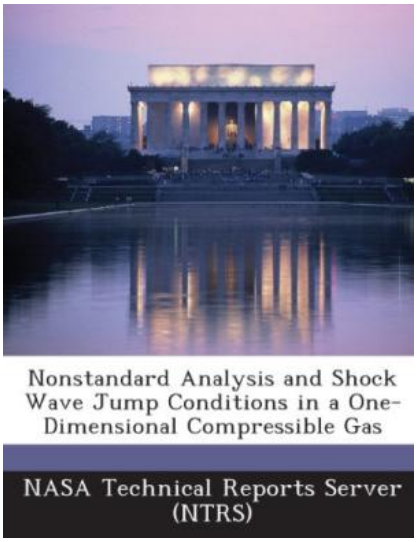


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Nonstandard Analysis and Shock Wave Jump Conditions in a One-Dimensional Compressible Gas

By -

Bibliogov, United States, 2013. Paperback. Book Condition: New. 246 x 189 mm. Language: English . Brand New Book ***** Print on Demand *****.Nonstandard analysis is a relatively new area of mathematics in which infinitesimal numbers can be defined and manipulated rigorously like real numbers. This report presents a fairly comprehensive tutorial on nonstandard analysis for physicists and engineers with many examples applicable to generalized functions. To demonstrate the power of the subject, the problem of shock wave jump conditions is studied for a one-dimensional compressible gas. It is assumed that the shock thickness occurs on an infinitesimal interval and the jump functions in the thermodynamic and fluid dynamic parameters occur smoothly across this interval. To use conservations laws, smooth pre-distributions of the Dirac delta measure are applied whose supports are contained within the shock thickness. Furthermore, smooth pre-distributions of the Heaviside function are applied which vary from zero to one across the shock wave. It is shown that if the equations of motion are expressed in nonconservative form then the relationships between the jump functions for the flow parameters may be found unambiguously. The analysis yields the classical Rankine-Hugoniot jump conditions for an inviscid shock wave. Moreover, non-monotonic entropy jump...

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