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Analytical Models for Shocks in Compressible Flow

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Analytical flow models frequently are not seen useful anymore for the acceleration of design processes in aerospace technology. Because of at least two reasons we defend the suitability of the classical knowledge base using mathematical models for compressible flow: This contribution is pleading for a modern view on flow models, with a timely extension by computer aided animation of complex flow patterns. The understanding of local shock dynamics via analytical model functions has clarified some seemingly contradictory requirements in the past, but nowadays computerized mapping techniques and fast graphic visualization will do this job efficiently. A strong educational aspect is an academic reason for maintaining this approach. Some examples for the local and global structure of transonic and supersonic shock waves will be illustrated. Such models give valuable hints for a suitable configuration parameterization incuding target pressure distributions for inverse design without an excessive number of optimization runs, a very practical reason to use model functions.

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