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Shock Formation and Disintegration in Fluids with Non-Convex Equations of State[1] FATEMEH BAHMANI, MARK CRAMER, Virginia Polytechnic Institute and State University — We consider the steady, two-dimensional, inviscid, high-speed, flow around thin turbine blade profiles with special attention given to fluids having a non-convex equation of state; such fluids are commonly known as Bethe-Zel'dovich-Thompson (BZT) fluids. We show that the essential flow physics can be described by an inviscid Burgers equation having quartic nonlinearity rather than the quadratic nonlinearity of perfect gases. In order to illustrate the flow behavior, a fifth-order WENO (weighted essentially non-oscillatory) numerical scheme is employed. New results of interest include the formation of oblique expansion shocks, shock-splitting induced by the interaction of a single shock with Mach waves, the capture of shock-fan combinations, and the collision of oblique compression and expansion shocks.

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Fatemeh Bahmani
Virginia Polytechnic Institute and State University

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