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Approximate Solutions for Nonlinear Acoustic Pulses Propagating Upstream in a Subsonic Flow FATEMEH BAHMANI, Chalmers University of Technology, MARK CRAMER, Virginia Polytechnic Institute and State University, TOMAS GRONSTEDT, Chalmers University of Technology — We have studied acoustic pulses traveling upstream in one dimensional subsonic flow. A sinusoidal pressure pulse is imposed at the right boundary and the transient wave propagation is studied. The undisturbed flow is assumed to be inviscid with uniform density and entropy. The flow velocity is taken to be uniform. N-waves are observed to form after the shock formation time. Due to interactions of the shocks with the waves in front and behind it, the wave amplitude decreases and the wavelength increases as the pulse wave propagates upstream. The variation of pressure coefficient with time and the strength of the pressure disturbances are presented. This solution provides a rough estimation of upstream traveling pulses and can be used to guide and check computations in many practical fluid mechanics applications.

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