Mathematical modeling of two metal plates impact using two-phase approach

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The goal of the work is the numerical investigation of two metal plates impact in the statement from [1] using two-phase compressible model [2]. In one-dimensional case the governing system of equations comprises seven equations: three conservation laws for each phase and transfer equation for the volume fraction of one of the phases. Both phases are considered to be compressible and non-equilibrium on velocities and pressures. The system has hyperbolic type but couldn’t be written in the conservative form because of nozzleing right-hand side terms. The computational algorithm is based on the Harten-Lax-van Leer numerical flux function. The robust computation in the presence of the interface boundary is carried out due to the special pressure relaxation procedure. The problem is solved using stiffened gas equations of state for each phase with the parameters calibrated using the data obtained with the use of wide-range equations of states for the metals. In simulations we got two shocks after the initial impact which propagate to the free surfaces of the samples with the parameters within the range of percents of error in comparison with wide-range equations of states computations.