

**Abstract:**

The goal of this paper is to present a supplementary step called post-extrapolation. When applied to the well-known Method of Characteristics (MOC), this ensures the continuous use of specified time steps or a regular numerical grid without interpolations during computations of transients in 1D two-phase flow in straight elastic pipes.

The new method consists of two steps. The first step is a typical MOC step, where the C- and C+ characteristics start from regular nodal points, allowing the point of intersection to differ from a regular one. After defining the variables at this intersection, the method transforms them to correspond to the nearest regular grid point, using the first derivatives contained in the original, nonlinear governing equations, as evaluated numerically from the variables obtained earlier in the neighboring nodes. This procedure requires no interpolations and deals only with grid-point values. Instead of Courant-type stability conditions, shock-wave catching and smoothing techniques help ensure numerical stability across a broad range of parameters, such as the closing time of a valve and the initial gas content of the fluid. Comparisons with traditional codes under specified boundary conditions and measurements on a simple TPV (tank-pipe-valve) setup show acceptable scatter.

**Keywords:** MOC, gas release, post-extrapolation, shock catching, transients