Material Properties on a Phase Boundary of a Multiphase Equation of State

CHRISTOPHER ROBINSON, AWE plc — Multiphase equations of state (EoS) may be constructed by determining a separate EoS for each individual solid (or liquid) phase. At a phase transition the two phases generally have different specific volume, energy and entropy. For specific volumes and energies between the two phases the EoS may be determined by assuming the material consists of a mixture of the two individual phases. This paper determines the material properties (bulk sound speed, specific heat etc.) in the mixed two-phase region along the phase boundary assuming the material consists of a mixture of the two single phases at the same pressure and temperature and in thermodynamic equilibrium. Some general relationships between the thermodynamic properties of the mixed two-phase region compared to the single-phase regions are then determined. The effect of a phase boundary on isentropic compression or release is considered.