

Abstract for an Invited Paper  
for the SHOCK09 Meeting of  
The American Physical Society

### **Empirical Multiphase EoS Modelling Issues<sup>1</sup>**

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With a change in pressure and temperature various materials undergo solid-solid phase transitions where the crystal structure changes. Melting of materials is also another phase transition. Across a phase boundary discontinuities in energy, density, and properties of the material are seen. Even small changes can have a significant effect such as wave splitting under shock loading. The changes will affect the equation of state and strength of a material and thus should be included in an accurate model. The kinetics of the phase transition may also need to be accounted for. A thermodynamically consistent multiphase EoS model is needed. In developing an empirical model a lack of data will likely be an issue, especially for higher pressure phases. When implementing into a hydrocode robustness and time efficiency of the method used needs to be considered. These issues are discussed here, with tin used as an example material.

<sup>1</sup>In collaboration with Christopher Robinson, Atomic Weapons Establishment, UK.