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Thermodynamically based equation of state for shock wave studies. Application to the design of experiments on tin. FRANCOIS BUY, CHRISTOPHE VOLTZ, FABRICE LLORCA, cea — This work is devoted to the evaluation of the behavior of complex metals under shock wave loading. This first work presents a methodology proposed for the design of specific experiments performed for the validation of equation of state models. We focus on tin because, on the one hand, of the multiphase behavior this material exhibits and, on the other hand, of the numerous works realized in the past years. While C. Mabire in 2000 mainly drew her attention on the evaluation of tin melting curve, our present work is focused on the two solid phases that tin can reach under shock loading. A thermodynamically based equation of state has been implemented which gives the opportunity to point out singularities which can be activated under particular shock wave loading. In the pressure-temperature diagram, the superimposed Hugoniot and release paths put in evidence the onset of double shock and of release shock configurations. We compare original experimental configurations to VISAR measurements to investigate the validity and the efficiency of the model for predicting the thermodynamical state of tin. The results prove a good ability of the model for the interpretation of the experimental data.

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