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Study on the release process of γ and α phase transition in cerium material XIAOMIAN HU, HAO PAN, National Key Laboratory of Computational Physics, Institute of Applied Physics and Computational Mathematics, Beijing 100088, China, CHENGDA DAI, QIANG WU, Laboratory for Shock Wave and Detonation Physics Research, Institute of Fluid Physics, China Academy of Engineering Physics, Mianyang 621900, China, NATIONAL KEY LABORATORY OF COMPUTATIONAL PHYSICS, INSTITUTE OF APPLIED PHYSICS AND COMPUTATIONAL MAT TEAM, LABORATORY FOR SHOCK WAVE AND DETONATION PHYSICS RESEARCH, INSTITUTE OF FLUID PHYSICS, CHINA ACADEM COLLABORATION — Cerium has lots of phase transition in high pressure and temperature. A volume change of about 15% occurs when Cerium is subject to high pressure ($\sim$0.7GPa) and $\gamma \rightarrow \alpha$ phase change takes place. The phase transition and constitutive model of Cerium can be respectively obtained by calculating the experiment results and taking account of the multi-phase equation of state (EOS). The calculated results indicate that in loading condition the phase transition pressure of Cerium is higher than quasi-static compression. The calculated results indicate that the phase transition under release is difficultly described because the $\alpha \rightarrow \gamma$ phase reversal is great influenced by plastic flow. Based on multi-phase equation of state, constitutive model and non-equilibrium phase transition equation, introducing quasi-elastic unloading rule simulated the phase transition under release. The calculated result is according with the experiment.

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