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Helmholtz Free Energy Equation of State Applied to the Carbon at Megabar Pressure JINKYUNG JUNG, KYU SOO JHUNG, INHO KIM, Agency for Defense Development, Korea — We provide a simple form of Helmholtz free energy equation of state that reproduces the Hugoniot of shock compressed porous carbon at megabar pressure. The equation of state consists of the modified Cowan ion EOS and a correction term related to the free energy that is independent of thermal motion. Analytic parameters in the EOS expression are determined by the room temperature isotherm and the Hugoniot curve of non-porous carbon. We compare our results with recent shock experiments up to 10 Mbar as well as theoretical approaches such as mean-field potential calculation of shock-compressed porous carbon.

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