Automated Generation of Tabular Equations of State with Uncertainty Information JOHN H. CARPENTER, ALLEN C. ROBINSON, BERT J. DEBUSSCHERE, ANN E. MATTSSON, Sandia National Laboratories* — As computational science pushes toward higher fidelity prediction, understanding the uncertainty associated with closure models, such as the equation of state (EOS), has become a key focus. Traditional EOS development often involves a fair amount of art, where expert modelers may appear as magicians, providing what is felt to be the closest possible representation of the truth. Automation of the development process gives a means by which one may demystify the art of EOS, while simultaneously obtaining uncertainty information in a manner that is both quantifiable and reproducible. We describe our progress on the implementation of such a system to provide tabular EOS tables with uncertainty information to hydrocodes. Key challenges include encoding the artistic expert opinion into an algorithmic form and preserving the analytic models and uncertainty information in a manner that is both accurate and computationally efficient. Results are demonstrated on a multi-phase aluminum model.

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