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Modeling Astrophysical Solids with FleCSPH[1] IRINA SAGERT, OLEG KOROBKIN, BING-JYUN TSAO, INGO TEWS, HYUN LIM, JULIEN LOISEAU, Los Alamos National Laboratory — We present the implementation of solid material modeling into FleCSPH [1], a general-purpose Smoothed Particle Hydrodynamics (SPH) code, developed at the Los Alamos National Laboratory. FleCSPH can efficiently compute hydrodynamic and long-range particle interactions like gravity. This, together with the implementation of various equations of state for nuclear matter as well as terrestrial materials, makes FleCSPH an interesting tool for astrophysical simulations.
The solid SPH implementation is intended to investigate the dynamical behavior of astrophysical solids, including matter in planetary impacts as well as the behavior of the solid neutron star crust. Here, we will give an overview of FleCSPH, show standard tests for the implemented elastic perfectly plastic material modeling and give a summary of current and future applications in planetary impact and compact star simulations.

[1] FleCSPH: The next generation FleCSIble parallel computational infrastructure for smoothed particle hydrodynamics, J. Loiseau, H. Lim, M. A. Kaltenborn, O. Korobkin, C. M. Mauney, I. Sagert, W. P. Even, B. K. Bergen, Software X, Vol. 12 (2020)

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