Discrete Element Model for Sea Ice (DEMSI)

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Here we present progress on the SciDAC funded Discrete Element Model for Sea Ice (DEMSI) project. The DEMSI project aims to develop a new sea ice component for E3SM using a discrete element method where parcels of sea ice are represented as finite sized Lagrangian particles. It is expected this methodology will improve model performance on next generation DOE heterogeneous computing architectures and improve model dynamical fidelity by explicitly representing complex contact physics. We present simulations demonstrating DEMSI's ability to represent ridging and sea ice convergence, to ameliorate the effect of this ridging on particle distribution by remapping techniques, and to simulate sea ice on the basin scale. We also demonstrate the model's performance on heterogeneous architectures.