nMHDust: A 4-Fluid Partially Ionized Dusty Plasma Code
SAMUEL LAZERSON, Geophysical Institute, University of Alaska, Fairbanks — nMHDust is a next generation 4-fluid partially ionized magnetized dusty plasma code, treating the inertial dynamics of dust, ion and neutral components. Coded in ANSI C, the numerical method is based on the MHDust 3-fluid fully ionized dusty plasma code. This code expands the features of the MHDust code to include ionization/recombination effects and the netCDF data format. Tests of this code include: ionization instabilities, wave mode propagation (electromagnetic and acoustic), shear-flow instabilities, and magnetic reconnection. Relevant parameters for the space environment are considered, allowing a comparison to be made with previous dusty plasma codes (MHDust and DENISIS). The utility of the code is expanded through the possibility of a small dust mass. This allows nMHDust to be used as a 2-ion plasma code. nMHDust completes the array of fluid dusty plasma codes available for numerical investigations into nonlinear phenomena in the field of astrophysical dusty plasmas.