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Numerical simulation of gaseous-granular multiphase flow with phase change and external heat input ZHENYANG DONG, ELAINE ORAN, Texas AM University — A new physical and numerical model for gas-granular multiphase flow of neutral gas, water vapor, ice, and dust with phase change between ice and water vapor was developed and tested. The objective is to investigate the ice formation process at the surface of the comet TEMPEL 1. A numerical test problem was set up to simulate a 1D vertical tube that can be constructed in a terrestrial laboratory. Conditions for the test problem are 0.2 atm and 250K. Simulations were performed with and without cyclic external heat input. As expected, ice and dust particles separate and lead to a final state with ice on the top and dust at the bottom. Surprisingly, this result is insensitive to the period of the heat cycle. These conclusions are explained based on the physical limits of the sublimation model. The next steps are to test the model in a laboratory experiments and then extend it to conditions more descriptive of the surface of a comet.

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