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PIV measurements of intracrater flow dynamics utilizing a mound-bearing impact crater model in a refractive index matched environment DIEGO GUNDERSEN, GIANLUCA BLOIS, KENNETH CHRISTENSEN, NATHANIEL BRISTOW, None — Impact craters are the most dominant large-scale topographic features on Mars and play a critical role in uncovering Mars' ancient history. One topography of interest concerns craters hosting a central mound. Knowledge of intracrater wind circulations is crucial in assessing the aerodynamic mechanisms that dictate the morphological evolution of impact craters. These vortical circulations are formed and modified due to an interplay between vortex shedding, ambient velocity gradients, and inhomogeneity of Reynolds stresses. Planar particle image velocimetry (PIV) measurements were conducted at multiple Reynolds numbers of flow over an idealized crater model in a refractive index matched (RIM) flume environment. The RIM technique acts to render the acrylic model transparent by equating its RI with that of the working fluid. This in turn affords optical access to the interior of the crater model and near-surface measurements. Mean flow statistics reveal large-scale symmetric counter-rotating intracrater recirculation regions coupled with a complex dynamic of detaching and reattaching flow. By collecting vector fields at two laterally offset wall-normal planes and vertically offset wall-parallel planes, we are able to infer the highly three-dimensional flow structure.

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None

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