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Wendy K. Caldwell*, wkcaldwell@lanl.gov, and **Abigail Hunter, Catherine S. Plesko** and **Stephen Wirkus**. *Understanding Asteroid 16 Psyche's Composition through 3D Hydrocode Impact Crater Models*.

Asteroid 16 Psyche is the largest M-type (metallic) Main Belt Asteroid, and an upcoming NASA mission will be the first of its kind to visit a metallic body rather than one composed of rock or ice. Psyche is likely the remnant of a differentiated planet core. However, because of its distant location and the limits of available measuring techniques, basic information about Psyche is under debate, including density and diameter. In this work, we study the composition of Psyche by modeling its largest impact craters. To our knowledge, this work is the first of its kind to use impact crater simulations to determine likely material compositions as well as the first 3D models of Psyche's craters. We study various possible material compositions and porosity levels in 2D and 3D, and our 3D simulations test oblique impact angles. From these simulations, we predict that Psyche is indeed likely mostly metallic with a porosity of about 50%. These predictions are consistent with the idea that M-type asteroids are differentiated planet cores. We will show additional simulation images and animations from 3D simulations with final crater dimensions within the expected uncertainties. (Received September 10, 2019)