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Cygnus Code Simulation of Magnetoshell Aerocapture and Entry System AKIHISA SHIMAZU, University of Washington, DAVID KIRTLEY, MSNW LLC, DAN BARNES, Coronado Consulting, JOHN SLOUGH, MSNW LLC — A Magnetoshell Aerocapture and Entry System (MAC) [1] is a novel concept for planetary atmospheric entry, which enables both manned and planetary deep space orbiter space missions that are difficult with present day technologies. The MAC uses a low-beta dipole plasma magnetoshell to produce a drag effect on the spacecraft through the collisional interactions between the entry atmospheric neutrals and the confined plasma in the magnetoshell, creating a dynamic and controllable plasma parachute for entry. To understand the performance and the behavior of the MAC, the Cygnus 2D Hall MHD code is used for this study. The Cygnus code is a 2D Hall MHD code with coupled external circuits, which has been originally developed for studying FRC formation, translation, merging, and compression. In this study, the Cygnus code is modified to support the MAC geometry with a simplified plasma-neutral model that accounts for electron-impact ionization, radiative recombination, and resonant charge exchange to simulate the collisional interaction processes for the MAC. [1] D. Kirtley et al. "A Plasma Aerocapture and Entry System for Manned Missions and Planetary Deep Space Orbiters", NASA NIAC Phase I Final Report, NNX12AR12G.

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