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Modeling the expansion of a contactor plasma ERIK HOGAN, GIAN LUCA DELZANNO, ENRICO CAMPOREALE, LANL, JOSEPH BOROVSKY, Space Science Institute, ELIZABETH MACDONALD, MICHELLE THOMSEN, LANL — Plasma contactor technology is widely used on board spacecraft to keep spacecraft charging levels under control. On the International Space Station, for instance, it is used to prevent high current discharges between differently charged surfaces. It consists of emitting a neutral plasma to create a plasma reservoir near the spacecraft in order to balance the currents collected by the spacecraft from the magnetospheric environment. One approach to modeling the contactor plasma plume applies a self-similar solution in order to gain insight into the plume dynamics without requiring expensive numerical simulations [1, 2]. Typically, hydrodynamic fluid equations are used to model the plasma behavior. We present a comparison of different self-similar plume models existing in the literature [1, 2] and compare these with our Particle-In-Cell simulations in the near-field to assess their validity. We will consider both the unmagnetized and the magnetized limit.

[1] F. F. Gabdullin, A. G. Korsun, E. M. Tverdokhlebova, IEEE Trans. Plasma Science 36(5) 2207 (2008).
[2] M. Merino, E. Ahedo, C. Bombardelli, H. Urrutxua, J. Pelaez, "Hypersonic plasma plume expansion in space," 32nd International Electric Propulsion Conference, IEPC-2011-086, Wiesbaden, Germany, 2011.

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