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Validated modeling of two-dimensional effects in carbon arcs. JIAN CHEN, Princeton Plasma Physics Laboratory, Princeton, NJ, 08543; Department of Engineering Physics, Tsinghua University, Beijing, China, 100084, ALEX KHRABRY, Princeton Plasma Physics Laboratory, Princeton, NJ, 08543; Lawrence Livermore Laboratory, Livermore, CA, 94550, ANDREI KHODAK, IGOR KAGANOVICH, YEVGENY RAITSES, Princeton Plasma Physics Laboratory, Princeton, NJ, 08543 — Short atmospheric-pressure arcs with ablating carbon anode are used for production of carbon nanoparticles. Comprehensive experimental study was recently performed using set of in-situ diagnostics [1]. Many arc parameters, such as the arc current and inter-electrode gap width, can significantly affect the carbon ablation rate and, consequently, the production of nanoparticles. In this work, we employed a previously developed self-consistent model [2] to study plasma properties of the short carbon arc in helium atmosphere. Temperature profiles were determined from the heat balance equations which accounts for radiation, electron emission, recombination of ions, space-charge sheaths and joule heating. A sheath model was used as an effective boundary condition for transport equations to determine the sheath voltage drop and particle fluxes on the electrodes. This model was implemented into ANSYS CFX code [2]. Results show that part of carbon ablated from anode center can return back to anode periphery; and current flows nonuniformly from a spot at anode; and the spot size increases with the arc current. **References** [1] V. Vekselman, *et al.,* PSST **26**, 065019 (2017). Additional references are available at nano.pppl.gov [2] A. Khrabry, *et al.* https://arxiv.org/abs/1902.09991.

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