

# Arc Initiation and Plasma Transport

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## P&EM News Note:

### Verification of Charged Particle Beam Dynamics in Aleph

We have performed a verification of charged beam dynamics in Aleph. Simulations of deuterium ion beams traversing in a vacuum were compared to a general envelope equation for cylindrically charged particle beams by Lee & Cooper. This theory predicts the evolution of particle beam size due to thermal energy of the ions but neglects the impact of self-repulsion of the charged beam. Aleph results agreed with the Lee & Cooper theoretical prediction within 0.14%. This theory is useful for predicting beam evolution for particle densities less than  $5 \times 10^{14}$  particles per cubic meter where beam self-repulsion becomes significant.

