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The design of uniform Poynting Vector RF antenna for the surface wave plasma. HEMA SWAROOP MOPIDEVI, THOMAS ANDERSON, Lam Research Corporation, RF TEAM — The power-coupling intermediary of inductive coupled plasma (ICP) is the coil's B-field whereas for RF surface wave plasma (SWP; e.g., 27Mhz) it is the near-field Poynting vector of radiation. Thus, the antenna need not be placed close to vacuum window alleviating capacitive coupling from the high voltage tips. To accommodate the large RF wavelength inside a small space, the antennas are often coiled or made into spiral shapes. This paper reports the calculations of near-field Poynting vector spatial uniformity between 2 types of antenna. First, a spiral dipole antenna is shown to have strong near-field in the high-current ring-region of the spiral; the surface wave could then cause plasma non-uniformity in the ring-region. Then, a quadrupole antenna is shown to have overcome the dipole's issue through radiations from both high- and low-current portions of the antenna (the high voltage tips): the antenna's geometry takes advantage of the tips' high voltage turning it into strong E-fields that will radiate by the displacement current term of the Maxwell-Ampere Equation. In other words, this antenna combines real- and displacement-current radiations to result in a spatially uniform magnitude of Poynting vector.

Hema Swaroop Mopidevi
Lam Research Corporation

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