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Enhanced Magnetic Field Perturbations and Electric Currents Observed Downstream of the High Power Helicon B. RACE ROBERSON, ROBERT WINGLEE, University of Washington, TIM ZIEMBA, Eagle Harbor Technology, JAMES PRAGER, University of Washington — The high power helicon (HPH) is a compact plasma source that can generate downstream densities of 10^{17}-10^{18} m^{-3} and directed ion energies greater than 20 eV that continue to increase tens of centimeters downstream of the source. In order to understand the coupling mechanism between the helicon antenna and the plasma outside the immediate source region, measurements were made in the plasma plume downstream from the thruster of the propagating wave magnetic field and the perturbation of the axial bulk field. This magnetic field perturbation (ΔB) peaks at more than 15 gauss in strength downstream of the plasma source and propagates tens of centimeters downstream, cancelling the base magnetic field as it propagates. Taking the curl of this measured magnetic perturbation and assuming azimuthal symmetry suggests a peak current density of 20 kA m^{-2}. Data will be presented that relates the cancellation of the base magnetic field to the propagation of the helicon wave and the region where the plasma current system closes.

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