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Detection of an electron beam in a high density plasma via an electrostatic probe[1] STEPHEN MAJESKI, Rensselaer Polytechnic Institute, JONGSOO YOO, STEWART ZWEBEN, MASAAKI YAMADA, HANTAO JI, Princeton Plasma Physics Laboratory — The perturbation in floating potential by an electron beam is detected by a 1D floating potential probe array to evaluate the use of an electron beam for magnetic field line mapping in the Magnetic Reconnection Experiment (MRX) plasma. The MRX plasma is relatively high density (10^{13} cm^{-3}) and low temperature (5 eV). Beam electrons are emitted from a tungsten filament and are accelerated by a 200 V potential across the sheath. They stream along the magnetic field lines towards the probe array. The spatial electron beam density profile is assumed to be a Gaussian along the radial axis of MRX and the effective beam width is determined from the radial profile of the floating potential. The magnitude of the perturbation is in agreement with theoretical predictions and the location of the perturbation is also in agreement with field line mapping. In addition, no significant broadening of the electron beam is observed after propagation for tens of centimeters through the high density plasma. These results demonstrate that this method of field line mapping is, in principle, feasible in high density plasmas.

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