Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Measuring current distributions with a probe that interrupts the current[1] PATRICK PRIBYL, WALTER GEKELMAN, JIA HAN, Univerrsity of California, Los Angeles — Current distributions inside plasmas have been measured for nearly as long as probes have been used in plasmas. The distribution is typically derived from magnetic field measurements using B-dot probes, and computing the curl of B. The B-dot probes used are typically compact and enclosed. The general assumption is that current flows around such a probe, so that the overall current distribution is relatively undisturbed and the measurements can be reasonably accurate. Other authors contradict the validity of such a measurement, asserting that the only workable measurement involves as minimal interruption as possible. In either case the sensor is mounted on a shaft of finite extent. The current work attempts to measure the degree to which the finite interruption of the current flow by both the probe itself and the shaft affects the overall measurement. We find that the compact enclosed B-dot measurement of the current profile works well so long as the probe is not too large. We will attempt to quantify the meaning of "too large". Methods for taking the curl will be discussed, for example how accurate is a 4 point measurement?

[1]Work supported by an NSF GOALIE award and performed at the Basic Plamsa Science Facility, UCLA

Walter Gekelman
Univerrsity of California, Los Angeles

Date submitted: 10 Jul 2019 Electronic form version 1.4