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## Spatially and temporally resolved measurements of load current delivery on the Z Pulsed Power Facility using the Z Line VISAR diagnostic

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Measuring the current delivered to a pulsed-power load is key to understanding its expected behavior. On the Z Pulsed Power Facility, the load current is most accurately measured using velocimetry techniques such as VISAR (Velocity Interferometer System for Any Reflector) and PDV (Photonic Doppler Velocimetry). These diagnostics measure the expansion of a metallic plate or 'flyer'that is driven by the magnetic pressure of the load current. To date, only point velocimetry measurements, which are temporally but not spatially resolved, have been obtained on Z. This limits the locations and conditions under which the load current can be inferred. In this paper, we present the first velocimetry data from the new Z Line VISAR (ZLV) diagnostic, which enables spatially and temporally resolved load current measurements.

To validate the performance of the ZLV diagnostic, a series of experiments were conducted using a nonimploding load driven with ~14 MA of current. In these experiments, the ZLV instrument was focused on the top plate of the load to obtain radially and temporally resolved velocimetry over a 4-mm field of view. Standard point velocimetry probes were fielded at several radii to cross-validate the ZLV measurements. High quality ZLV data with 4-µm and 40-ps pixel resolution were obtained on the first attempt, and cross-comparisons to both the point probe data and to numerical models serve to validate the ZLV measurements. Velocimetry data with the newly demonstrated spatial and temporal resolution are expected to transform the understanding of load current delivery on Z.

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