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Characterizing the volume of a compressed Taylor state object in the SSX plasma[1] L. J. BARBANO, E. M. SUEN-LEWIS, J. E. SHROCK, M. KAUR, Swarthmore College, D. A. SCHAFFNER, Bryn Mawr College, M. R. BROWN, Swarthmore College — A cookbook of numerical techniques (namely wavelet transforms, smoothing filters, and spline interpolations) is applied to characterize the length of a stagnating Taylor state object in SSX. This length analysis uses magnetic field data from a linear array of 20 evenly spaced 2-D $\dot{B}$ probes positioned along the compression can axis. A 3-D animation of the Taylor state object's magnetic field in the compression volume reveals the object's wavelet-like magnetic structure in space. In order to localize the object in space and characterize its length, a continuous wavelet transform is performed. The most dominant spatial frequency given by the resulting frequency-space spectrogram is taken to be the length of the object in the compression volume. This analysis is performed at every time in the $\dot{B}$ time series to give some measure of the Taylor state object's length as a function of time. This length, in conjunction with the cross-sectional area of the compression can, gives the object's volume. Information about the object's volume as a function of time allows us to identify instances of compressive heating and investigate the magnetothermodynamic (MTD) properties of the SSX plasma.

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