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Excluded flux measurements of long-lived field-reversed configuration plasmas MATTHEW THOMPSON, JON DOUGLASS, KURT KNAPP, MICHEL TUSZEWSKI, ALAN VAN DRIE, Tri Alpha Energy, Inc., THE TAE TEAM — Diamagnetic measurements of field-reversed configuration (FRC) plasmas produced in the C-2 experiment are obtained with a linear array of 19 magnetic probes positioned along the length of the stainless steel confinement vessel. The excluded flux axial profile of the FRC, which approximates the separatrix shape, is calculated from this probe data under the assumptions of vessel wall flux conservation, coaxial symmetry, and negligible plasma pressure outside the separatrix. While initially valid, it is found that these assumptions break down towards the end of the ~ 1 ms FRC lifetime. Magnetic probes placed on the outside of the confinement vessel detect significant flux leakage through the vessel wall. Both radiation bolometer measurements and additional magnetic probes around the circumference of the vessel indicate that FRC motion off of the central axis increases with time. In addition, axial shrinkage causes large uncertainties in estimating the separatrix length and volume. The errors caused by these non-ideal effects are quantified and methods for correction are discussed.

Matthew Thompson
Tri Alpha Energy, Inc.

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