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FRC Separatrix inference using machine-learning techniques JESUS ROMERO, THOMAS ROCHE, Tri Alpha Energy, THE TAE TEAM — As Field Reversed Configuration (FRC) devices approach lifetimes exceeding the characteristic time of conductive structures external to the plasma, plasma stabilization cannot be achieved solely by the flux conserving effect of the external structures, and active control systems are then necessary. An essential component of such control systems is a reconstruction method for the plasma separatrix suitable for real time. We report on a method to infer the separatrix in an FRC using the information of magnetic probes located externally to the plasma. The method uses machine learning methods, namely Bayesian inference of Gaussian Processes, to obtain the most likely plasma current density distribution given the measurements of magnetic field external to the plasma. From the current sources, flux function and in particular separatrix are easily computed. The reconstruction method is non iterative and hence suitable for deterministic real time applications. Validation results with numerical simulations and application to separatrix inference of C-2U plasma discharges will be presented.

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