Abstract Submitted
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Studies of the DIII-D disruption database using Machine Learning algorithms[1] CRISTINA REA, ROBERT GRANETZ, Massachusetts Institute of Technology, ORSO MENEGHINI, General Atomics — A Random Forests Machine Learning algorithm, trained on a large database of both disruptive and non-disruptive DIII-D discharges, predicts disruptive behavior in DIII-D with about 90% of accuracy. Several algorithms have been tested and Random Forests was found superior in performances for this particular task. Over 40 plasma parameters are included in the database, with data for each of the parameters taken from ∼500k time slices. We focused on a subset of non-dimensional plasma parameters, deemed to be good predictors based on physics considerations. Both binary (disruptive/non-disruptive) and multi-label (label based on the elapsed time before disruption) classification problems are investigated. The Random Forests algorithm provides insight on the available dataset by ranking the relative importance of the input features. It is found that q_{95} and Greenwald density fraction (n/n_G) are the most relevant parameters for discriminating between DIII-D disruptive and non-disruptive discharges. A comparison with the Gradient Boosted Trees algorithm is shown and the first results coming from the application of regression algorithms are presented.

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