Higher Fidelity Surrogate Models for Gyrokinetic Simulations

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Motivations

- Real-time integrated modelling of plasma transport is bottlenecked by even the fastest gyro-kinetic simulations.
- AI Gyro-kinetic surrogate models have been shown to be fast enough without significant precision loss.
- How can we improve on these AI models and which methods work best?

Results

- Accurate Decision Tree model to predict linear stability trained on QuaLiKiz EDGE10D dataset.
- Scaling with number of training points and dimensions to extrapolate to training using GKW simulation data with significantly less training points.

Challenges

- Limited computation time.
- How do we efficiently generate useful simulation data from higher fidelity but slower gyro-kinetic codes?