## GTC simulation of turbulence and transport in tokamak plasmas

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Large scale turbulence simulations of fusion plasmas have advanced from code development and verification, to fundamental physics discovery, and now to code validation, where comprehensive simulations are subjected to stress tests using data from existing experiments. Since there are many more possible physical processes causing transport in fusion plasmas than that can be accurately simulated by existing fusion codes, validation of first-principles simulation requires fundamental physics understanding and comparisons across the whole spectrum of the primacy hierarchy (particularly at the lower end). An example is the turbulence characteristic time scales that reflect the nonlinear interactions underlying instability saturation and transport processes for both ion and electron channels. An intense effort of the gyrokinetic particle simulation project is to compare GTC simulation results with measurements guided by physics insights. Initial GTC simulation of DIII-D plasmas will be discussed.

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