

# Highly collisional two-fluid and gyrokinetic simulations of tokamak edge turbulence and the transition between kinetic and fluid regime

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Gyrokinetic and non-local fluid codes have complementary limitations in the tokamak edge. To arrive at a common basis, the gyrokinetic code CGYRO and the non-local two-fluid code NLET have both been applied to identical parameters sets ranging from resistive ballooning turbulence - approaching the collisional fluid limit - relevant to the edge of a tokamak, up to high-gradient kinetic ITG modes at higher temperatures in the core-edge transitional regime, yielding comparable results. As a non-trivial, novel result, linear growth rate and nonlinear transport agree between the codes in the fluid limit of high collision numbers ( $\nu_e \sim 500-10000 c_i/R$ ), not least, because the kinetic code employs the Sugama collision operator with momentum and energy conservation, Galileian invariance and exact self-adjointness property.

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