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Using DNS Data to Validate the Steady-State 2D/3C Model of Turbulence in Plane Couette Flow DENNICE GAYME, BEVERLEY MCKEON, California Institute of Technology, ANTONIS PAPACHRISTODOULOU, University of Oxford, BASSAM BAMIEH, University of California, Santa Barbara, JOHN C. DOYLE, California Institute of Technology — Given the consensus that turbulent flow is characterized by coherent structures and observations of streamwise-elongated structures in numerical simulations and experiments (in the near wall region), we model the mean behavior of fully turbulent plane Couette flow using a streamwise constant projection of the Navier Stokes (NS) equations. This projection results in a two dimensional/three component ($2D/3C$) model comprised of two equations; one in terms of the spanwise/wall normal stream function $\psi(y, z, t)$ with noise forcing, and the other in terms of the stream-wise velocity, $u(y, z, t)$, and $\psi(y, z, t)$. This model is nonlinear but analytically more tractable than the full NS equations and was previously shown to have a single globally stable solution. In the present work we use the steady state $2D/3C$ model to explain features of the turbulent velocity field obtained from DNS data by Kawamura *et al.* with $Re_w = 3000$ ($Re_\tau = 52$).

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