Slowing down convective instabilities in corrugated Couette-Poiseuille flow

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Movie1.mp4: Flow evolution throughout the linear amplification process captured for the CP_2 case. The process is started with small amplitude Gaussian noise perturbation and traced up to and past the onset of nonlinear interactions at saturation time T_s. Conditions correspond to $A = 0.462$, $Re = 300$ and $\beta = 0.292$ ($Re_{cr} = 296$, $\beta_{cr} = 0.292$). In the upper left corner, towards the negative z, iso-surfaces of the second invariant of the velocity gradient tensor taken at 80% of the instantaneous maximum and coloured by streamwise vorticity also scaled by respective instantaneous maximum. Towards the positive z-direction, streamwise velocity iso-surface at $w = 0.2$ and coloured according to the spanwise velocity component u along with iso-surfaces of the absolute second invariant of the velocity gradient at $Q = 1.5 \cdot 10^{-4}$ (appearing around saturation time Ts). The same is shown from the top perspective in the top-right part. In the bottom scaled streamwise vorticity (left) and streamwise velocity (right).

Movie2.mp4: Flow evolution throughout the linear amplification process captured for the CP_3 case. The process is started with small amplitude Gaussian noise perturbation and traced up to and past the onset of nonlinear interactions at saturation time T_s. Conditions correspond to $A = 0.455$, $Re = 340$ and $\beta = 0.281$ ($Re_{cr} = 313$, $\beta_{cr} = 0.281$). Composition is the same as in CP_2 case, with iso-surfaces of the absolute second invariant of the velocity gradient at $Q = 5 \cdot 10^{-4}$ (also appearing around saturation time T_s).

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