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Regenerative transient growth on a vortex column[1] ERIC STOUT, FAZLE HUSSAIN, U. Houston — Perturbations on a Lamb-Oseen vortex column with a circulation overshoot (due to a sheath of negative axial vorticity, $-\Omega_z$, surrounding the core) are studied by DNS of the incompressible Navier-Stokes equations, for a range (500-12500) of the vortex Reynolds number (Re= circulation/viscosity). Initial perturbation radial (rad.) vorticity is tilted by the mean strain into perturbation azimuthal (az.) vorticity, which generates *positive* Reynolds stress necessary for energy growth. The meridional flow of az. vorticity tilts $-\Omega_z$ into intensifying rad. vorticity, increasing the +Reynolds stress, which results in exponential energy growth. +Reynolds stress also transports azimuthal momentum radially *outward*, reducing the overshoot magnitude, which determines $-\Omega_z$. The resulting decreased rad. vorticity reduces the +Reynolds stress, arresting instability growth (with concomitant increase in viscous dissipation). Outward transport of azimuthal momentum also produces -Reynolds stress, which then transports azimuthal momentum *inward*. A new circulation peak appears nearer to the column axis, initiating a period of new, regenerative transient growth – a promising scenario for turbulence generation near the vortex column.

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