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The Self-Sustaining Process for Taylor-vortex flow LAURETTE TUCKERMAN, PMMH-CNRS-ESPCI, France, TOMMY DESSUP, MSC, Univ Paris 7, France, DWIGHT BARKLEY, University of Warwick, United Kingdom, JOSE EDUARDO WESFREID, PMMH-CNRS-ESPCI, France, ASHLEY WILLIS, University of Sheffield, United Kingdom — The Self-Sustaining Process (SSP) of Waleffe, like Hall's Vortex-Wave Interaction theory, was proposed as the fundamental element of turbulence in low Reynolds number turbulence in wall-bounded shear flows and consists of three phases. (i) Streamwise vortices bend nd the streamwise velocity contours via advection. (ii) The undulating streamwise velocity leads to waviness in the vortices via Kelvin-Helmholtz instability. (iii) Nonlinear interaction of the wavy streamwise vortices promotes the streamwise vortices. We explore the SSP for Taylor-vortex flow, for which streamwise (azimuthal) and wavy vortices are genuine steady states resulting from linear instabilities with well-defined thresholds. In particular, we determine the circumstances under which wavy vortices reinforce Taylor vortices.

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