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Global Stability of the Flow Induced by Wall Injection

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The linear stability study of the Taylor flow is led with perturbations evolving in two space directions, corresponding to the stream-plane, instead of the usually used single direction for stability study. Thanks to this approach, the spectrum of the stability modes is found to be discrete what allows a better comprehension of the thrust oscillations of large solid propellant motors, whose internal flow can be represented by the flow induced by wall injection of fluid, since particular frequencies are established. The eigenfunctions exhibit particular points, comparable to amphidromic points when studying the tide of the seas. These points may be a reason of the quasi-exponential spatial growth of the perturbations (unstable flow) and whose presence may be due to the curvature of the streamlines of the Taylor flow.

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