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Lateral shaping and stability of a stretching viscous sheet¹ BENOIT SCHEID, Harvard University, SARA QUILIGOTTI, BINH TRAN, Saint-Gobain Recherche, HOWARD STONE, Harvard University — We investigate the changes of shape of a stretching viscous sheet by controlling the forcing at the lateral edges, which we refer to as lateral shaping. We propose a one-dimensional model to study the dynamics of the viscous sheet and systematically address stability with respect to draw resonance. Two class of lateral forcing are considered: (i) For the case that the tension at the edges is specified, we show that a pure outward normal tension S_n is usually unfavorable to the draw resonance instability as compared to the case of stress-free lateral boundaries. Alternatively, a pure streamwise tangential tension S_t is stabilizing. (ii) For the case that the lateral velocity at the edges is specified, we show that the stability properties are problem specific but can be rationalized based on the induced tension components (S_n , S_t).

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