Supplemental Videos

S1: Movie (3000fps) of curling dynamics of a ribbon with TSN=7.5 (PVC200, $a_0 = 0.6$ cm, $W = 0.3$ cm).

S2: Movie (3000fps) of curling dynamics of a ribbon with TSN=2100 (PVC200, $a_0 = 0.6$ cm, $W = 5$ cm).

S3: Movie (10000fps) of curling dynamics without solid substrate interaction. Upper sequence: ribbon with small TSN (PVC100, $W = 0.4$ cm, $a_0 = 0.6$ cm); down: ribbon with large TSN (PVC100, $W = 3.5$ cm, $a_0 = 0.6$ cm).

S4: Movie (100 fps) showing a specific frustrated curling dynamics when the natural radius of the ribbon is 0.32 times its eslastogravitational length L_g (PP90, $W = 3.5$ cm, $a_0 = 4.0$ cm).

S5: Movie (100fps) of curling dynamics of a ribbon in water (PVC100, $a_0 = 1.25$ cm).

S6: Movie (100fps) of curling dynamics of a ribbon in water (PVC100, $a_0 = 0.5$ cm).