

Electronic Supplementary Information for the Manuscript
“Controlled Propagation and Jamming of a Delamination Front”

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ESI.1 Methods

Sample Preparation

We use a Polydimethylsiloxane (PDMS) rubber sample for our observations. The sample was prepared by mixing the Sylgard 184 (Dow Corning) PDMS base with the cross-linking agent at 50:1 (base:cross-linker) ratio and homogenizing it in a planetary centrifugal mixture. The mixture was poured into a rectangular-shape mould, de-gassed using a vacuum pump, cured in an oven at 100°C for 2 hours and then cooled at room temperature. The dimensions of the cured layers were 20 mm (width) × 100 mm (length) × 5 mm (thickness). The observations for the peeling of the PDMS layer were made at room temperature.

Measurement of the Young’s Modulus

Young’s modulus of the PDMS sample used in this work has been obtained from Chockalingam et al.¹ where the same base to cross-linker ratio was used and the same preparation protocol was followed. Since our loading rate is much faster compared to the relaxation times of PDMS, we choose $E = 30$ kPa (referred to as the instantaneous modulus in Chockalingam et al.¹).

Experimental Setup and Procedure

Our setup for the test comprised of two parts: the PDMS layer adhered to a rigid glass plate (due to the adhesive nature of the PDMS layer) and the Instron[®] machine to carry out the displacement-controlled peeling. The attachment to the Instron[®] machine was modified to ensure that a zero-slope boundary condition can be maintained while pushing the layer (see the video for details). The camera was kept fixed in taking the observations. The layer-plate assembly was in vertical orientation due to the constraint of the Instron[®] machine; as a result, large post-buckled shapes show minor asymmetry due to the effect of a gravity.

ESI.2 Supplemental Observations

We conducted three trials from the same sample. The displacements were extracted from the experimental images and normalized by the thickness of the sample to ensure consistency with modeling. The evolution of detached length with the applied displacement is shown in fig. SI.2.1 for the two additional trials. We use the model to find the $l - u_0$ curve that fits best with the experiments for each trial, and use it to determine γ and λ . Note that it is challenging to locate the exact displacement where the delamination initiates, thus it can be a source of error in the analysis. Video of the experimental trial reported in the Fig. 1 in main text, is available online at this [link](#).

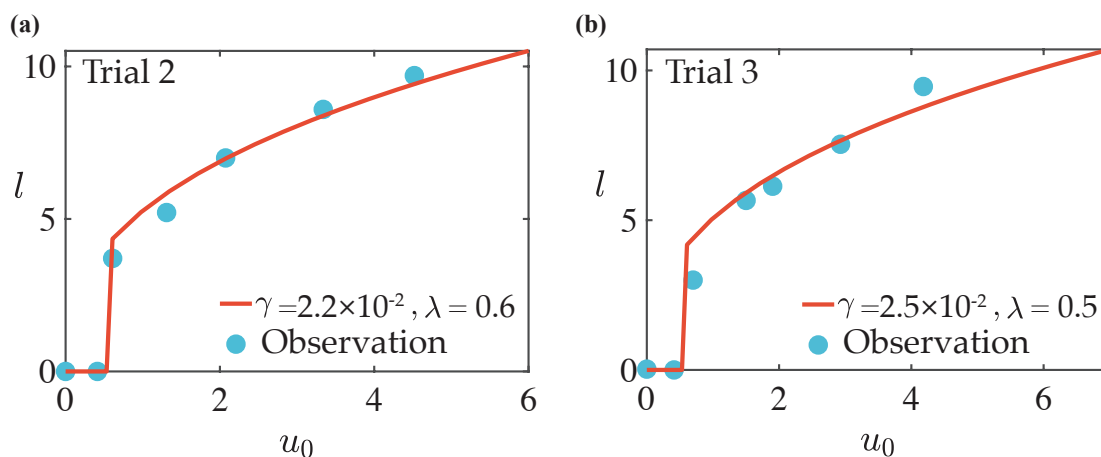


Fig. SI.2.1 Supplemental observations: The detached length l for different applied displacements u_0 was measured for two additional cases. By using the model to find the best fit to the observational data, we obtain γ and λ for each trial.

References

- 1 S. Chockalingam, C. Roth, T. Henzel and T. Cohen, *arXiv preprint arXiv:2007.11090*, 2020.