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Collapse of Non-Rectangular Channels in a Soft Elastomer DANIEL TEPAYOTL-RAMIREZ, Carnegie Mellon University, YONG-LAE PARK, Harvard University, TONG LU, CARMEL MAJIDI, Carnegie Mellon University — We examine the collapse of microchannels in a soft elastomer by treating the sidewalls as in- denters that penetrate the channel base. This approach leads to a closed-form algebraic mapping between applied pressure and cross-sectional deformation that are in strong agreement with ex- perimental measurements and Finite Element Analysis (FEA) simulation. Applications of this new approach to modeling soft microchannel collapse range from lab-on-a-chip microfluidics for pressure-controlled protein filtration to soft-matter pressures sensing. We demonstrate the latter by comparing theoretical predictions with experimental measurements of the pressure-controlled electrical resistance of liquid-phase Gallium alloy microchannels embedded in a soft silicone elas- tomer.

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