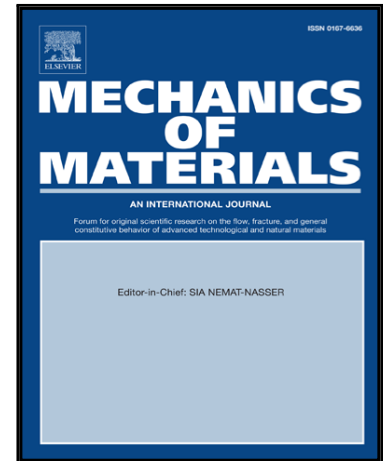


## Accepted Manuscript

A Representative Volume Element Model for the Adhesion Between a Micro-Pillared Surface and a Compliant Substrate

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**Highlights**

- We developed and verified a finite element model which captures the contact between an effectively rigid micro-pillar array and a compliant substrate. The model was validated against our previous experimental work for the same contact geometry.
- We conducted a parametric study to analyze the pull-off force and apparent pull-off stress between a micro-pillar array and compliant substrate while varying the micro-pillar height and spacing parameters.
- Our results indicate that if pillar radius is kept constant while pillar spacing and aspect ratio are varied, the pull-off force will only be affected for two cases: (1) pillar spacing is small enough where the local stress and deformation around each pillar influences that of neighboring pillars and (2) pillar spacing is large enough and pillar height small enough that the soft substrate contacts the backing layer of the micro-patterned substrate. Additionally, the apparent pull-off stress will generally decrease as pillar spacing increases.

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