UNIVERSITÀ DEGLI STUDI DI TRENTO
Dipartimento di Ingegneria Civile, Ambientale e Meccanica

INSTABILITIES

Instabilities and nonlocal multiscale modelling of materials
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AVVISO DI SEMINARIO

Si comunica che **mercoledì 20 luglio 2016 a partire dalle ore 14.30**
si terrà presso l'aula **R2** (via Mesiano 77) il seguente seminario

Optimal load sharing in bioinspired fibrillar adhesives

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I will describe how a bunch of clever and hardworking students and research associates have pioneered the use of Bio-inspired dry adhesives rely on the utilization of short-range intermolecular Van der Waals forces harnessed by intimate contact at fibril tips. These fibrils constitute the interface of the adhesive system, and the combined adhesive strength of them can only be utilized if equal load sharing (ELS) is obtained at detachment. Previous investigations have highlighted how nucleation and propagation of interfacial flaws are raised by mechanical coupling of fibrils through a compliant backing layer via creation of load concentration. Misalignment of the adhesive and contacting surface has not been considered in such theoretical framework. Alignment imperfections are difficult to avoid for a flat-on-flat interfacial configuration and, in this work, we demonstrate that interfacial misalignment can significantly alter the kinematics of detachment and the adhesive performance in such model. Misalignment angle, fibril separation, and fibril compliance are shown to control the transition between two regimes, namely (i) backing layer interactions dominated and (ii) misalignment dominated. In the latter regime, backing layer deformation can counteract misalignment, giving rise to improved load sharing when compared to an identical fibrillar array with a rigid backing layer. This result challenges the conventional belief that stiffer (and thinner) backing layers give better adhesive performance.
As a final result, the analytical distribution of fibril compliance, required to harness backing layer interactions to obtain ELS, is obtained. These results inform the design of fibrillar arrays with graded compliance capable of exhibiting improved load sharing over large areas.

Tutti gli interessati sono invitati a partecipare.

Il seminario è organizzato dal gruppo di Scienza delle Costruzioni
(D. Bigoni, L. Deseri, N.Pugno, A. Piccolroaz, F. Dal Corso, M.F. Pantano, R. Springhetti)

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