UNIVERSITÀ DEGLI STUDI
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Dipartimento di Ingegneria Civile,
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Instabilities and nonlocal multiscale modelling of materials
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AVVISO DI SEMINARIO

Si comunica che **martedì 10 luglio 2018 a partire dalle ore 10.00**
si terrà presso l'aula **R2** (via Mesiano 77) il seguente seminario

Buckling of rings: A revisit

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In this presentation, we consider buckling of two types of rings under loadings. We first study magnetic rings consisting of identical rigid spherical beads, each of which possesses a uniform permanent magnetization strength, and subject to magnetic and mechanical loadings. While the magnetic loading is caused by a fixed dipole placing at the center of the ring, the mechanical loading is the pressure loading, such as uniform central loading, inverse-square central loading, dead loading, and normal loading, applying to the centers of each bead in the ring. We showed that the magnetic ring can exhibit in-plane or out-of-plane buckling modes, depending on the type of the loading. Moreover, using the effective bending stiffness of the magnetic rings, introduced by Vella et al. (Proc. Roy. Soc. A, 470, 20130609, 2013), we determined a (dimensionless) pressure parameter, defined for both magnetic and mechanical loadings. We found that in the continuum limit as the number of beads in the ring becomes infinite while keeping the radius of the ring constant, the value of pressure parameter at which buckling occurs is smallest for magnetic loading and it is largest for uniformly centrally mechanical loading. We next study (nonmagnetic) classical rings made from filaments with circular cross-sections and uniform mechanical properties under four types of mechanical loading, as mentioned above. We found that numerous studies on buckling of classical rings under these mechanical loadings provided misleading results because all literature works incorrectly assumed the ring always first buckles via in-plane buckling modes. Specially, the value of pressure parameter at which buckling occurs is only correct for cases of normal loading and inverse-square central loading while it is overestimated for cases of dead loading and uniform central loading. We showed that the ring compressed by dead loading and uniform central loading can first buckle via out-of-plane buckling modes, at values of pressure parameter lower than those found from literatures. Finally, in comparison of the classical ring and the magnetic ring of the same radius and the same effective bending stiffness, the correct values of pressure parameter at which the classical ring buckles are the same as those at which the magnetic ring buckles, under the same type of above mechanical loading in the continuum limit.

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, D. Misseroni)

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