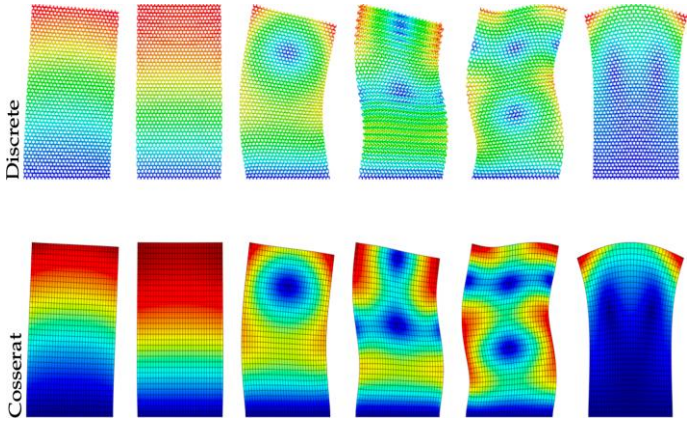
HDM
HRVATSKO DRUŠTVO ZA MEHANIKU
ZAGREB – OSIJEK – RIJEKA – SL. BROD – SPLIT

PREDAVANJE

Mechanics of homogenized micro-structured materials via Cosserat elasticity

Dr. Nicholas Fantuzzi
University of Bologna
Department of Civil, Chemical, Environmental and Materials Engineering



Srijeda 8.6.2022. I 11:15 h
Sveučilište u Rijeci, Tehnički fakultet
Vukovarska 58 I Rijeka I Vijećnica fakulteta
www.csm.hr

HRVATSKO DRUŠTVO ZA MEHANIKU

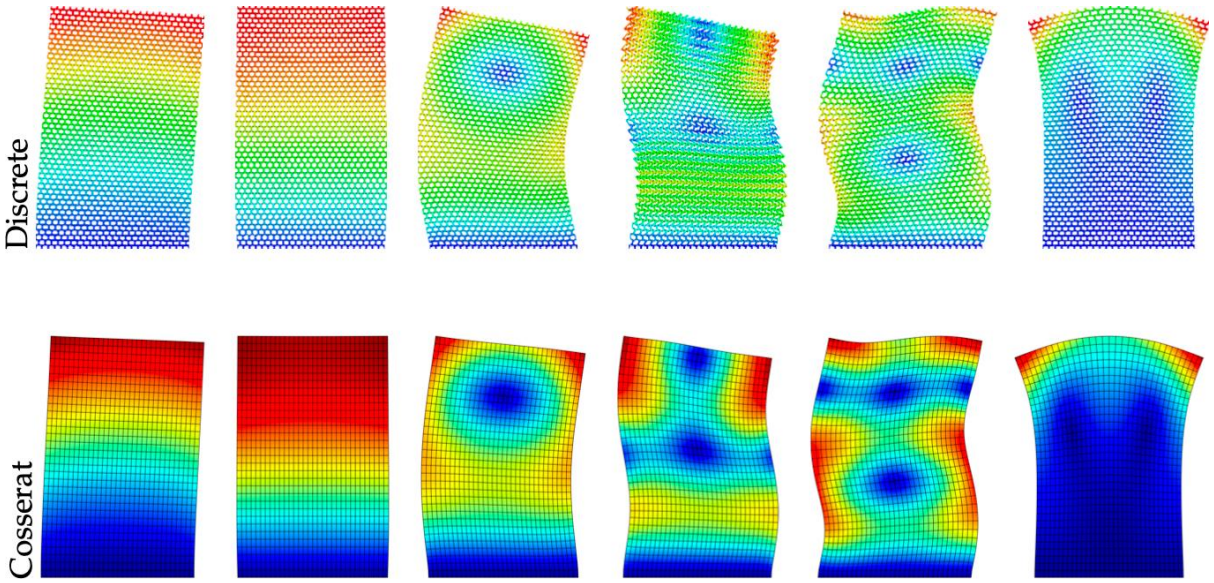
CSM
CROATIAN SOCIETY OF MECHANICS
ZAGREB – OSIJEK – RIJEKA – SL. BROD – SPLIT

Abstract

Mechanics of homogenized micro-structured materials via Cosserat elasticity

Dr. Nicholas Fantuzzi
Department of Civil, Chemical, Environmental and Materials Engineering, University of Bologna, Italy

Particle composites include materials like ceramic, metal composites, poly-crystals, and masonry. Due to the presence of different heterogeneities (rigid or soft inclusions, voids, microcracks, etc.) whose size may have an important impact on their behavior at the macroscopic scale, mechanical modelling is a challenging task.
Non-local theories offer a solution to this problem while maintaining memory of the microstructure, especially the internal length. Differently to local classical models, non-local models (micropolar/Cosserat might be considered non-local continua of implicit type) can account for internal lengths in the field equations, which are significant in many cases.
The aim of this work is the mechanical characterization of anisotropic composites made of rigid particles and thin elastic interfaces at different level scale for investigating both statical and dynamical behavior. To find the anisotropic constitutive properties of those materials, a homogenization technique based on an energy equivalence criterion between a discrete model of the material and a continuum one is adopted. Two continuum model descriptions, one micropolar and the other classical, are compared to the discrete system, assumed as benchmark. Different material symmetry classes, both centrosymmetric and non-centrosymmetric, are considered and the advantages of micropolar modelling are highlighted.



CSM
CROATIAN SOCIETY OF MECHANICS
ZAGREB – OSIJEK – RIJEKA – SL. BROD – SPLIT

Biography

Nicholas Fantuzzi was born in Bologna, June 16, 1984. Bachelor and Master degrees in Civil Engineering obtained at the University of Bologna in 2006 and 2009 both with grade 110/110 cum laude. PhD in Structural Engineering and Hydraulics at the University of Bologna in 2013. He covered the following positions at the University of Bologna. From Jun 2017 to Oct 2018 Junior Assistant Professor. From Nov 2018 to Oct 2021 Senior Assistant Professor (tenue-track). Since Nov 2021 Associate Professor.

Since 2017 Teacher of the course “Modelling of Offshore Structures” and of the course “Advanced Structural Mechanics” in the International Master degree in Offshore Engineering (former Civil Engineering-Offshore Curriculum).

Winner of 3 international awards. He participated in the organization or co-chaired 14 International Conferences on composite structures and mechanics of solids and structures.
Invited Keynote Speaker at 8 International Conferences.
He is Associate Editor of “Composite Structures”, Elsevier. Associate Editor of “International Journal of Structural Integrity”, Emerald and Section Editor-in-Chief of “Mathematical and Computational Applications”, MDPI.
Reviewer activity on more than 110 international journals. Author of more than 130 international peer reviewed journal papers, 9 books (in Italian and English) and more than 100 abstracts in national and international conferences.

His research interests are application of composite materials in offshore engineering, design and strengthening of offshore components via numerical modeling. Fatigue and fracture in offshore components.

He is currently Local Coordinator in PRIN2020 project: “Zero Impact MUltifunctional 3D printed composite materials for biomedical and industrial applications in the neXt generation society (ZIMuX)” (2022-2025).
He is Scientific Representative for Roofy Srl in Nu.Ma. project for innovative materials for civil and building applications and Scientific Representative for Carbon Dream SpA in TERSA Project for an advanced flying vehicle.