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COMPUTATIONAL ANALYSIS AND METHODS FOR SOLIDS AND STRUCTURES WITHIN GENERALIZED CONTINUA

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ABSTRACT

This Minisymposium welcomes theoretical and application-oriented submissions focusing on computational analysis of, and numerical methods for, solids and structures relying on models of generalized continuum theories such as micropolar, couple stress, micromorphic, strain gradient and nonlocal theories [1]. These theories have roots in the seminal works of Cauchy in the 1850s, Voight in the 1880s and the Cosserat brothers in the 1900s [2], whereas a major revival of the generalized theories took place in the 1960s by such famous names as Mindlin, Toupin, Green and Rivlin [1,2]. Although the second revival started in the modern times of the 1980s with a focus on simplified theories [2], the development of computational methods for generalized continua has had a minor role in the first decades of the movement. Very recently, however, there has been a growing interest for applying and developing appropriate computational methods for the non-standard problems of generalized continua (see [3] and the review therein) and accomplishing computational analysis for related applications (e.g. [4]).

REFERENCES

[1] G.A. Maugin, "A historical perspective of generalized continuum mechanics", In: H. Altenbach, G.A. Maugin, V. Erofeev (eds.), *Mechanics of Generalized Continua*, Springer, pp. 3–14, 2011.

[2] H. Askes, E.C. Aifantis, "Gradient elasticity in statics and dynamics: An overview of formulations, length scale identification procedures, finite element implementations and new results", *International Journal of Solids and Structures*, Vol. **48**, pp. 1962–1990 (2011).

[3] J. Niiranen, J. Kiendl, A.H. Niemi, A. Reali, "Isogeometric analysis for sixth-order boundary value problems of gradient-elastic Kirchhoff plates", *Computer Methods in Applied Mechanics and Engineering* , Vol. **316**, pp. 328–348 (2017).

[4] E M. Ferretti, A. Madeo, F. dell'Isola, P. Boisse, "Modelling the onset of shear boundary layers in fibrous composite reinforcements by second gradient theory", *Zeitschrift für Angewandte Mathematik und Physik*, Vol. **65**, pp. 587–612 (2014).