Séminaire LVA - MEGA

N-th Gradient continua: general theory and microscopic structures. Perspectives in wave propagation

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Salle de cours du LVA- INSA de Lyon

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The pioneering work by Gabrio Piola between 1824 and 1856 opened new perspectives in Continuum Mechanics. The success of the particular case studied by Cauchy decreased the impact of Piola's work until very recently. Indeed in the époque of nanotechnologies the mathematical treatment of Piola became needed in order to study microscopically inhomogeneous mechanical systems.

In this presentation: the mathematical treatment proposed by Piola is developed by using Levi-Civita absolute calculus and Piola's micro-macro identification is developed by means of the modern techniques of Gamma convergence. Finally the applications of the theory are considered: it is proposed the conception of a new metamaterial which is intrinsically a second or higher gradient continuum and some properties of waves traveling in these materials are described.