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A new perspective for analyzing experimental tests on biomaterials

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Given the increasing interest for the biomaterials in medical and engineering field, the objective of this talk is the theoretical and experimental analysis of the biomaterials in order to define experimental procedures and mathematical models suitable for their mechanical characterization. The biomaterials exhibit a rheological behavior intermediate between that of purely elastic materials and that of the purely viscous materials and therefore are called viscoelastic ones. In the past the "classical" models as Maxwell and Kelvin-Voigt have been used to capture viscoelastic phenomena. However, these models are not consistent to model the viscoelastic behavior of real materials, since the Maxwell type can capture the relaxation tests only and the Kelvin-Voigt the creep tests. A more realistic description of creep and/or relaxation is given by a power law function with real order exponent. As soon as we assume a power law function for creep, the constitutive law relating deformation and stress is ruled by a Riemann-Liouville fractional integral with order equal to that of the power law. In this regard, recent studies have been stressed that the most suitable model for capturing the viscoelastic behavior is the spring-pot, characterized by a fractional constitutive law. Based on the aforementioned considerations, it is apparent that the need of theoretical as well as experimental development and exploration of materials with novel physical characteristics. For instance, if the giant grass *Arundo donax* (AD) has to be characterized; then, attention is devoted on searching a proper model for characterizing the behavior of giant reeds. To aim at this, firstly, meticulous experimental tests have been performed in the Laboratory of structural materials of University of Palermo. Further a novel aspect of using an advanced Euler-Bernoulli model to fit experimental data of bending tests will be introduced.

Biography

Antonina Pirrotta has graduated in Civil Engineering from the Palermo University in 1987. She has done her PhD in Structural Engineering in 1996 and as Post-doctoral studies in 1998. In 2000, she became a Researcher, in 2001 Associate Professor and in 2016 Full Professor in the Structural Engineering department at the University of Palermo. She is the author and co-author of about 90 scientific papers dealing with the following fields: stochastic dynamics, active and passive control, stochastic differential calculus. Since 2014, she is a Professor in the Department of Mathematical Sciences, University of Liverpool, UK.

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