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SPECTRAL METHODS IN CONTINUUM MECHANICS

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ABSTRACT

The minisymposium "SPECTRAL METHODS IN CONTINUUM MECHANICS" is intended to present a recent and significant progress in the area of developing and applying spectral methods (SMs) to different fields of continuum mechanics. In particular, it will consists of the topics regarding SMs in solid mechanics (e.g. for deformable solid structures as rods, beams, plates, shells etc.), in fluid mechanics (biomedical engineering, geophysics, astrophysics, and biology), and, in general, for a vibration analysis of mechanical models.

SMS have appeared at the end of the sixty and have become popular up to now for solving several important scientific and engineering problems with high accuracy requirements. Usually the approaches use Fourier's transform and orthogonal polynomials. The global bases are constructed with applications of trigonometrical, Legendre, Chebyshev, Laguerre and Hermite polynomials. SMs have a global approach while, for example, finite element methods are locally defined. For this reason, when a solution is smooth, spectral methods have excellent error properties, with so-called exponential (spectral) convergence.

The theoretical ideas and numerical investigations of spectral methods in several fields of science and engineering, along others, can be found in the books of Boyd, (2000), Canuto et_al (1988), Hesthaven et al. (2006), Gottlieb and Orszag (1987), Guo (1998).

The topics of the MS, but not limited, are: 1) Theoretical aspects of using spectral methods in mechanics; 2) Spectral analysis of problems of solid mechanics; 3) Approximations of problems of fluid dynamics; 4) Vibration analysis of mechanical models.

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