Expression of Interest

Contact Person/Scientist in Charge

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University CEU Cardenal Herrera

Department / Institute / Centre

- **Name:** Universidad CEU Cardenal Herrera (CEU UCH)
- **Address:** Avd. Seminario S/N 46113 Moncada
- **Province:** Valencia

Research Area

- Mathematics (MAT)

Brief description of the institution:

CEU Cardenal Herrera University belongs to the CEU San Pablo University Foundation which is a non-profit charitable educational institution with over 75 years' worth of experience in the field of education. In the context of the European framework in which we find ourselves, the internationalisation of the Research in our University is one of our main objectives.

Brief description of the Centre/Research Group (including URL if applicable):

Our University belongs to the San Pablo-CEU Foundation, the most important private education organization in Spain, having more than 26,000 students and 24 centers in all educative levels, among those three Universities in Madrid, Barcelona and Valencia.

CEU-UCH is among the top four Spanish private universities in research rankings (Shanghai Ranking Expanded, IUNE, international ranking SCIMAGO), being the best positioned in Valencia.

The university has a clear commitment to research (+3 million euros of investment and more than 40 projects) as a basis to develop academic excellence that benefits our students and society.

The CEU Research Institute of Design, Innovation and Technology (IDIT) hosted by Universidad CEU Cardenal Herrera de Valencia was created in 2004 to promote and stimulate scientific and technical updating and to encourage agreements for scientific and technical cooperation with other public or private entities. The research team include 17 members and have made significant breakthroughs in the field of multi-physics modeling and advanced numerical simulation.

Project description:

This research project aims to construct a general framework for model reduction methods. The main goal is the extension to the Dirac Frenkel variational principle. More precisely, we believe that it is possible to construct a geometric variational framework in order to explain the Proper Orthogonal Decomposition POD and the Proper Generalized Decomposition PGD. The starting point is to consider the projection of a dynamical system, considered as a vector field on the ambiance manifold, over the tangent bundle of an embedded/immersed sub manifold (the reduced order model). Some natural question arise in this framework. A first one: Is the projected system a true dynamical system over embedded/immersed submanifold (the reduced order model), that is, it is a vector field in the embedded/immersed submanifold (the reduced order model)? Another interested and non trivial question is the control of the errors in the reduced order model. Another important task is to extend gradient-like algorithms for variational problems over low-rank tensors manifolds. The main idea is the use the fiber bundle structure of tensor manifolds in order to construct some kind of “natural retractions”. The idea is to combine the gradient of the functional together the structure group of the fiber bundle to propose gradient- like algorithms on tensor manifolds. We would point out that the fiber bundle structure depends on the tensor format under consideration, that is, on the associated tree that characterizes the tensor format. In consequence, the first task will be to provide a characterization, depending on the shape of the tree (Tucker tensors, TT-tensors ...), to construct an associate structure group

Applications

Please send CV and motivation letter