CONTROL AND STABILIZATION FOR PARTIAL DIFFERENTIAL EQUATIONS

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Partial Differential Equations (PDEs) are one of the central research areas in Mathematical Analysis. Over several centuries, it has grown to be a rich domain of Mathematics. The last century has been particularly fruitful for the study of PDE's and many fundamental problems have been tackled and, if not completely solved, well understood. To mention a few famous contributors, we cite Hadamard, Douglas, Leray, Garding, Lewy, Petrowski, Sobolev, Mizohata, Friedrichs, De Giorgi, Lax, Nirenberg, Treves, Hörmander, Fefferman, Bourgain, Lions. The area is rapidly growing partially because PDE's are a very powerful tool for modeling many diverse phenomena, in physics, mechanics, chemistry, biology, economics, etc. The panorama of applications of PDE's is huge, ranging from the most classical ones in engineering, such as the design of structures, to the most modern and sophisticated in nanotechnology, biology, and medicine. In general terms, existence results can be viewed as a confirmation of the correcteness of the model. Uniqueness, regularity and stability results are related to the usefulness of the model.

Controllability and observability of Ordinary Differential Equations have been set at the centre of control theory by the work of R. Kalman in the 1960's and soon after they have been generalized to the infinite-dimensional context. Among the early contributors we mention D.L. Russell, H. Fattorini, T. Seidman, A.V. Balakrishnan, R. Triggiani, W. Littman and J.-L. Lions.

Nowadays, it is accepted that controlling is at least as important as solving systems of PDE's and as a consequence the control of systems governed by PDE's (observability, stabilization, exact controllability) is a quickly growing area of mathematics.The complexity of the systems (specifically, when nonlinear terms appear and when dealing with nonscalar systems) leads to many nontrivial difficulties and, accordingly, most interesting questions are open.

The proposed theme has its scientific importance for fundamental and applied research. In addition to its important theoretical developments it also has great impact in applied science and engineering, including: applications to stabilization, design of physical systems, image processing, mathematical finance, medicine, biology among others.

In this special session we are trying to put together the expertise of

worldwide leaders in the subject and young mathematicians that works in Brazilian or French institutions. We think that this combination can be the key point of further collaborations and can help strengthen the long relationship between Brazil and France in the area of Partial Differential Equations

The proposed theme is topical, dynamic and it perfectly fits within the current trend of worldwide scientific research.

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