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EDITORIAL

This two-part theme issue of the *International Journal of Bifurcation and Chaos* is a collection of tutorials, reviews and papers presented at the International Interdisciplinary School on *Space–Time Chaos*: *Characterization*, *Control and Synchronization* held at the University of Navarre, Pamplona, Spain, 19–23 June, 2000, under the scientific direction of the Guest Editors.

The School was organized by the Institute of Physics, University of Navarre with the aim of bringing together students and researchers from different fields, in order to assess the recent achievements in subjects related to complex spatiotemporal phenomena in both the theoretical and experimental areas, and to point out new trends and future directions. Lectures especially focussed on the recent advancements in the fields of control, synchronization and characterization of complex space-extended systems, covering subjects such as the analysis of experimental data, the diffusion limited aggregation and Laplacian growth problems, communication using chaotic carriers, noise effects in spatially-extended systems, control and synchronization of chaos, riddling and on–off intermittency, and the problem of a definition for complexity. We wish to thank all lecturers who contributed to educate the audience toward newer perspectives in the respective fields, and to have created a charming atmosphere and highly stimulating scientific discussions.

It is generally assumed that space–time chaotic dynamics refers to a process wherein a space-extended system gives rise to structures (or patterns) erratically evolving in both space and time. However, the above only provides a qualitative description, whereas, despite the many attempts of having a quantitative framework for describing pattern formation and competition in extended systems, a universally accepted definition of space–time chaos is not yet available. On the other hand, after many decades of active studies on low-dimensional chaos in nonextended, or extended but space uniform dynamical systems, pattern formation and competing phenomena have become a topic of active study in many scientific fields as diverse as materials science, hydrodynamics, nonlinear optics, chemistry, biology and biophysics, earth science, physiology and plasma physics. Therefore, the importance of characterizing quantitatively space–time chaotic dynamics is justified by the necessity of bringing together in the same theoretical framework so different topics, as well as seeking the universal features emerging in different experimental conditions.

Furthermore, two questions are intimately related to the problem of characterizing patterns and their space–time dynamics. The first is to which extent the setting of these structures in ensembles of coupled systems can be related to the emergence of collective synchronization states among the dynamical evolution of the individuals constituting the ensemble. The second is how a space–time chaotic situation can be suitably controlled toward desired configurations.

Since the original proposals for control and synchronization of low-dimensional chaos, the last ten years have seen remarkable developments in the study of these two processes, particularly with respect to projecting the early and pioneering approaches to the more complex situations that are presented when facing space–time chaotic dynamics. There is now a developing area of control and synchronization of space–time chaos that has an essential feature such as a strong interaction of theory and experiments, a strong interdisciplinarity, thus making possible a knowledge sharing process amongst researchers from very different and apparently orthogonal fields.

The spirit of the School was to find a novel interdisciplinary language and a scientific background along this new orientation, with the hope that unifying a basic knowledge on space–time chaos with specific approaches to control and synchronization would lead to new perspectives for the solution of some forefront problems in this field.

We are extremely grateful that the *International Journal of Bifurcation and Chaos*, as witnessed by its long and qualified record of published papers, has always shown a particular attention to interdisciplinary and multidisciplinary subjects, and in this view has hosted the publication of most of the outcome of this event. We would also like to acknowledge the fruitful advice and cooperation rendered to the organization by members of the School Scientific Committee: F. T. Arecchi (Italy), C. Grebogi (Brazil), J. Kurths (Germany), I. Procaccia (Israel), K. Showalter (USA) and L. Vázquez (Spain), as well as all colleagues who chaired the different sections of the School.

Besides lecturers, more than one hundred PhD or postdoc students attended the School, whom we would like to gratefully thank for their participation, for their contributions with talks and poster presentations as well as for having profusely discussed the different presented subjects from very diverse viewpoints — from applied mathematics, to engineering, laser physics, chemistry, biophysics and ecology, statistical mechanics, electronics. We feel indebted to all members of the local Department of Physics and Applied Mathematics, and to all staff of the University of Navarre, who contributed to the success of the school.

Finally, we would like to express our sincere gratitude to all contributors of this special issue, as well as to all colleagues who assisted us in the refereeing process. Their comments, suggestions and remarks have in our opinion significantly improved the quality of the manuscripts.

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