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FOREWORD

Variational integrators in nonholonomic and vakonomic mechanics

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Nonholonomic mechanics is a traditional topic in Mathematics and Engineering Sciences, due to its applications in robotics and motion planning, among others. The introduction of new geometric tools has been permitted a fast development in the last years, and nowadays nonholonomic mechanics is a very active research topic within the area known as Geometric Mechanics. Looking for applications, there is a need to develop adapted numerical methods for this kind of mechanical systems, therefore the discrete versions of nonholonomic mechanics have attracted a lot attention in recent years, in some cases incorporating the more sophisticated but natural language of Lie groupoids.

On the other hand, vakonomic dynamics is based on the Calculus of Variations applied to lagrangian functions subject to nonholonomic constraints. Vakonomic dynamics finds interesting applications to Optimal Control Theory, and it is also important to get numerical methods.

Both different but related views of dynamics were discussed in a recent exploratory workshop *Variational Integrators in Nonholonomic and Vakonomic Mechanics*, held in Madrid (September, 16–18, 2009; Real Academia de Ciencias Exactas, Físicas y Naturales).

The present issue of the Revista de la Real Academia de Ciencias Exactas, Físicas y Naturales Serie A Matemáticas (RACSAM) contains the contributions originated from that workshop. We are confident that this special issue will provide new insights in the field.

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The workshop has included 11 plenary talks and a poster session.