



A.D. 1308
unipg
DIPARTIMENTO
DI MATEMATICA E INFORMATICA

Giovedì 23 giugno alle 12.00 nella Sala Riunioni del dipartimento

il professor Milo Viviani della Scuola Normale Superiore di Pisa terrà il seminario dal titolo:

On the geometric aspects of some symplectic integrators for isospectral flows

Abstract: Isospectral flows are abundant in mathematical physics; the rigid body, the Toda lattice, the Brockett flow, the Heisenberg spin chain, and point vortex dynamics, to mention but a few. Their connection on the one hand with integrable systems and, on the other, with Lie-Poisson systems motivates the research for optimal numerical schemes to solve them. Several works about numerical methods to integrate isospectral flows have produced a large varieties of solutions to this problem. However, many of these algorithms are not intrinsically defined in the space where the equations take place and/or rely on computationally heavy transformations. In the literature, only few examples of numerical methods avoiding these issues are known, for instance, the spherical midpoint method on $so(3)$.

In this talk we present a new minimal-variable, second order, numerical integrator for isospectral flows intrinsically defined on quadratic Lie algebras and symmetric matrices. The algorithm is isospectral for general isospectral flows and Lie-Poisson preserving when the isospectral flow is Hamiltonian. The simplicity of the scheme, together with its structure-preserving properties, makes it a competitive alternative to those already present in literature.

On the other hand, unlikely to the already mentioned spherical midpoint method, the numerical scheme presented in this talk still lacks of a description in terms of Riemannian geometry. Understanding the metric structure of our method might allow to remove the calculations of the auxiliary internal stage, resulting in a overall lower computational cost.

Link Aula virtuale Teams:

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