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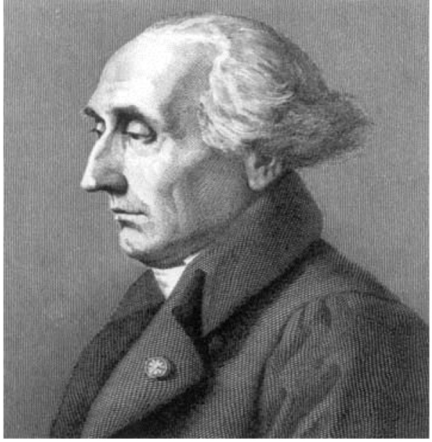

SSST
SCUOLA DI STUDI SUPERIORI
FERDINANDO ROSSI
UNIVERSITÀ DEGLI STUDI DI TORINO

LEZIONE LAGRANGIANA

Prof. Simon Salamon

King's College London

Space curves, vector fields and strange surfaces

26 maggio 2016 alle 14.30
Aula Magna del Dipartimento di Matematica
Via Carlo Alberto 10, Torino

ABSTRACT: Starting from the celebrated equations of Serret and Frenet, we shall explain how space curves are characterized up to isometry by two functions of arc length, namely curvature and torsion. Whilst the former is non-negative by definition, the latter can take either sign, which indicates the "instantaneous chirality" of the curve. If both functions are constant and non-zero, one obtains a helix, but computer graphics make it easy to plot other curves with assigned curvature and torsion. This theory is then applied to the trajectories of vector fields in space, and here we reach a higher level of complexity. It is possible to associate to a given vector field the surface formed by those points where the torsion of the trajectory vanishes. We explore this for a variety of vector fields, including the one that encapsulates the meteorological equations giving rise to the Lorenz attractor. Rather striking images lead to more general questions about the zero sets of high-degree polynomials in space. The talk is based in part on my article "Dynamic surfaces" in the Springer Proceedings "Mathematics and Modern Art" published in 2010.

La Lezione Lagrangiana del Professor Salamon è organizzata in collaborazione con la "Scuola di Studi Superiori Ferdinando Rossi" dell'Università degli Studi di Torino.

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