

Centre Interfacultaire Bernoulli

Public lecture in the
«Poisson Geometry in Mathematics and Physics» Conference

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Tuesday July 8th, 2008 from 5:30 PM to 6:30 PM
in Room CO2

*The Inception of Symplectic Geometry: The Works of
Lagrange and Poisson during the years 1808-1810*

Abstract

Symplectic structures appeared for the first time, as far as we know, in the paper presented on the 22nd of August 1808 by Joseph Louis Lagrange before the Institut de France. This work dealt with the variation of the orbital elements of the planets in the solar system. In order to derive the equations of these variations, Lagrange developed the so called "method of variation of constants", and expounded it in full generality in two papers, presented on the 13th of March 1809 and the 19th of February 1810 before the Institut de France. We will discuss the ideas contained in these three papers. The quantities that today are called "Lagrange's parentheses" are the components, in a chart whose coordinates are the chosen integration constants, of the symplectic form on the manifold of motions of the mechanical system under consideration. We will also discuss Siméon Denis Poisson's contributions to the subject. His paper of the 20th of June 1808 stimulated Lagrange's interest in the variations of orbital elements, on which Lagrange had not worked during the twenty previous years; and in his paper of the 16th of October 1808, Poisson introduced a very useful complement to Lagrange's work, by defining the quantities that are today called the "Poisson brackets". Finally, we will present the method of variation of constants in modern terms.

Lecture in French and audio-visual support in English

<http://www.math.unizh.ch/poisson2008/>