Collecting titles, abstracts, themes, dates, for scheduling
"Marsden Workshop, Toronto, July 2012"

Organizing committee: D. E. Chang, D. D. Holm, G. Patrick, T. S. Ratiu

27 June 2012

1 Collecting titles, abstracts, themes, dates, for scheduling

Dear Friends, the time has come.

Please send us emails with your proposed

1. format(s): lecture, summer school minicourse, minisymposium, etc.
2. title(s),
3. abstract(s),
4. theme(s): relation(s) to the main theme(s) of the program,
5. date(s), either in order of preference or as a set of choices

for scheduling "Marsden Workshop, Toronto, July 2012".

Examples are given below.

Please respond immediately. Thanks!

All the best,

The organizing committee:

Dong Eui Chang `dechang@uwaterloo.ca`
Darryl Holm `d.holm@ic.ac.uk`
George Patrick `patrick@math.usask.ca`
Tudor Ratiu `tudor.ratiu@epfl.ch`

2 Examples

- Cesare Tronci, University of Surrey, United Kingdom

  `c.tronci@surrey.ac.uk`

  Format One Lecture

  Proposed date(s) Any time during my stay at Toronto.
  ****

Title: Collisionless kinetic theory of rolling molecules

Abstract: A collisionless kinetic theory is presented for an ensemble of molecules undergoing nonholonomic rolling dynamics. Nonholonomic constraints lead to problems in generalizing the standard methods of statistical physics. For example, no invariant measure is available. Nevertheless, a consistent kinetic theory is formulated by using Hamilton's variational principle in Lagrangian variables. Also, a cold fluid closure is presented.

(Joint work with Darryl D. Holm and Vakhtang Putkaradze)

++

- Holger Dullin University of Sydney, New South Wales, Australia

holgerdullin@googlemail.com

Holger.Dullin@sydney.edu.au

Format Two submissions, either as Lectures or Short Courses

Proposed date(s) Any time during my stay at Toronto, 2-12 July and 17-27 July

****

Title: The Lie-Poisson structure (and integrator) of the reduced N-body problem

Abstract: We reduce the classical n-body problem in d-dimensional space by its full Galilean symmetry group using the method of invariants. As a result we obtain a reduced system with a Lie-Poisson structure which is isomorphic to $\mathfrak{sp}(2n-2)$, independently of d. The reduction preserves the natural form of the Hamiltonian as a sum of kinetic energy that depends on velocities only and a potential that depends on positions only. Hence we proceed to construct a Poisson integrator for the reduced n-body problem using a splitting method. The method is illustrated by computing special periodic solutions (choreographies) of the 3-body problem for $d = 2$ and $d = 3$.

Fits in with "Geometry and Mechanics", and also has links to "Geometric Integration"

Title: Geometric Phase in Aerial Motion

Abstract: Gymnasts and divers in aerial motion use their shape to control their orientation. Utilising shape change it is possible to turn even with vanishing angular momentum, as the falling cat testifies. We will show that in certain cases the optimal shape change which maximises the overall rotation can be found using a variational principle. These ideas will be illustrated in a number of settings including the shape-changing equilateral pentagon, planar motion in trampolining, and three dimensional motion of divers performing a twisting somersault.

Fits in with "Geometry and Mechanics" and with "Control and nonholonomic mechanics".

Author comments *The 1st one could be an advanced 2/3/4-hour seminar. Either contribution could be used as a 4-hour course in the summer school.*

I could also give either contribution (in short form) as conference talk in the last week.

++

- David Meier, Imperial College London, UK (Organizer)

d.meier09@imperial.ac.uk

Francois-Xavier Vialard, vialard@ceremade.dauphine.fr

François Gay-Balmaz, gaybalma@lmd.ens.fr

Christopher Burnett, c.burnett10@imperial.ac.uk

Format   Minisymposium of 4 talks in 90 minutes

Proposed date(s)   Wed 18 July, 2.00 - 3.30 pm

****

Title: Higher-order variational principles (aka splines)

   I   Author, Title, Abstract

  II   Author, Title, Abstract

 III   Author, Title, Abstract

 IV   Author, Title, Abstract

Author comments   *Fits in with "Geometry and Mechanics", with "Control and nonholonomic mechanics" and with "Geometric Integration".*

+++

- David Ebin, Stoneybrook

  `ebin@math.sunysb.edu`

Format   Colloquium lecture

Proposed date(s)   Middle of the week of July 9-13

****

Title: The history and impact of Ebin and Marsden 1970.
Abstract: TBA

Author comments   This colloquium lecture would fit with the "Geometry and Mechanics" theme of the Marsden Focus Program at Fields. It is also a topic in mathematical analysis of nonlinear PDEs.

+++

- Darryl Holm, Imperial College London

  `dholm@ic.ac.uk`

Format   Colloquium lecture

Proposed date(s)   Any time the program needs a colloquium in July

****

Title: Momentum Maps, Image Analysis & Solitons
Abstract: This survey talk discusses some opportunities for geometric mechanics in the problem of registration of images, e.g., planar closed curves. It turns out that many aspects of geometric mechanics apply in this problem, including soliton theory and momentum maps. Much of this talk is based on work done with Jerry Marsden (1942 - 2010). Some trade secrets will be revealed.

Author comments   *Fits in with "Geometry and Mechanics", with "Control and nonholonomic mechanics" and with "Geometric Integration".*

+++

- Darryl Holm, Imperial College London

  `dholm@ic.ac.uk`

Format   Summer School short course of 3-7 lectures, as needed.

Proposed date(s)   Any time the Jerry program needs a short course in July

****

Title: Fundamentals of Geometric Mechanics, illustrated in examples from Fermat, Euler, Lagrange, Hamilton, Lie, Poincaré, Arnol'd and Marsden

Abstract: We will review some of the concepts of flows and smooth transformations in the applications of geometric mechanics in examples. These concepts include, for example, Ad*-equivariant momentum maps and isospectral flows.

Author comments   *Fits in with "Geometry and Mechanics" and with "Control and nonholonomic mechanics", and will refer to "Geometric Integration". Lectures will be adjusted to the needs of the students, based on their written responses collected after each lecture.*

+++