# Abstracts of the June 23 session of the Paris-London Analysis Seminar

**Olivier Glass (Université Paris-Dauphine),**

*Control of the motion of a fluid at low Reynolds number.*

Abstract. I will describe a result obtained with Thierry Horsin (Conservatoire national des arts et métiers, Paris), concerning the possibility of prescribing the motion of a zone of a fluid inside a domain, by means of a boundary control. When the fluid is very viscous (and modeled by the stationary Stokes equation), we obtain results proving that prescribing this motion is indeed possible in an approximate way. This relies on an adaptation for the Stokes equation of Runge's theorem concerning the approximation of holomorphic functions by rational functions.

**Oana Pocovnicu (Heriot-Watt University),**

*A two-soliton with transient turbulent regime for a focusing cubic nonlinear half-wave equation on the real line .*

Abstract. In this talk we consider a nonlocal focusing cubic half-wave equation on the real line. Evolution problems with nonlocal dispersion naturally arise in physical settings which include models for wave turbulence, continuum limits of lattice systems, and gravitational collapse. The goal of the talk is to present the construction of an asymptotic global-in-time modulated two-soliton solution of small mass, which exhibits the following two regimes: (i) a turbulent regime characterized by an explicit growth of high Sobolev norms on a finite time interval, followed by (ii) a stabilized regime in which the high Sobolev norms remain stationary large forever in time. This talk is based on joint work with P. Gérard (Orsay, France), E. Lenzmann (Basel, Switzerland), and P. Raphael (Nice, France).

**Michael Ruzhansky (Imperial College London),**
*Very weak solutions to wave equations.*

Abstract. In this talk we will discuss the wave type equations with time-dependent very singular (distributional) coefficients. Examples will include the wave equation for the Landau Hamiltonian as well as equations arising in acoustics and in shallow water problems. We present two type or results: for equations with Hölder coefficients (in the spirit of Colombini, de Giorgi, and Spagnolo), and for equations with distributional coefficients (very weak solutions). There appear some interesting phenomena that we will discuss (also numerically). If time permits, we will also give results on for the corresponding wave equations for the sub-Laplacian on stratified Lie groups (e.g. on the Heisenberg group) as well as for higher order operators (such as Rockland operators on graded Lie groups). The talk will be mostly based on different joint works with Claudia Garetto and Niyaz Tokmagambetov.

**Joseph Viola (Université de Nantes),**
*The Hamilton flow and Schrödinger evolution for degree-2 complex-valued Hamiltonians.*

Abstract. Given a (complex-valued, degree 2) polynomial on phase space, we can study both the (classical) Hamilton flow and the (quantum) Schrdinger evolution. We discuss the relationship between these two objects: most concretely, we will show how to use the Hamilton flow to find the $L^2$ operator norm of the Schrödinger evolution, when this evolution operator is compact.