limit we formally recover the Helmholtz-Kirchhoff model for the evolution of point-vortices. The present expansion systematically incorporates the effects of both viscosity and finite vortex core size. We also show that a low-order truncation of our expansion leads to the representation of the flow as a system of interacting Gaussian i.e. Oseen) vortices which previous experimental work has shown to be an accurate approximation to many important physical flows [6].

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MS63

The Shooting Manifold for Reaction-Diffusion Equations in d Dimensional Space

Many reaction diffusion systems admit spatially localized traveling wave solutions which are dynamically stable under small perturbations. We show that this implies the existence of solutions which are roughly the linear superposition of many of these pulses, provided they are well-separated and are moving in different directions. These solutions are also dynamically stable. The main complication in establishing such results is due to the fact that one cannot simplify the problem by working in a co-moving reference frame. As a result, one has to invert a non-autonomous linear operator which is not a small perturbation of a time-independent one. Nevertheless this operator has certain special properties which allow us to treat it as if it were small. Certain of the solutions we construct represent a number of pulses "shooting" in towards one another from spatial infinity. All together, our results imply that the collision of several pulses is a well-defined scattering problem. By this we mean that investigations into the nature of the strong interactions which take place during the collision will not be affected by specific choices for the initial data which lead to this collision.

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MS64

Solitons and Semiconductor Microlasers

Creation and manipulation of microlasers which can be switched on and off by external optical control beams are demonstrated using a semiconductor microcavity (VCSEL) with frequency-selective feedback. These microlasers are interpreted as laser cavity solitons and are stabilized by nonlinearities. Frequency selection, polarization properties and dynamics of these structures are analyzed and approaches to modeling are discussed.

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MS64

Modelling of Quantum Dot Microcavities

We present an overview of the modelisation and study of the spatio-temporal dynamics of the coherent field emitted by a semiconductor microcavity based on self-assembled Quantum Dots. The pattern scenario is described and experimentally achievable conditions are predicted for the occurrence of stable cavity solitons.

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MS64

Switching with Coupled Photonic Crystal Cavities

Integrated photonic structures, such as photonic crystal cavities and ring resonators, have proven to be effective nonlinear devices. Here, we review the novel possibilities when multiple cavities are coupled to each other. Their strong and highly tunable feedback properties lead to effects such as switching with very low powers and symmetry breaking bifurcations. These phenomena are useful for all-optical flip-flop devices. The compact nanophotonic

structures are efficiently analyzed with coupled-mode theory and rigorous numerical methods.

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MS64
Bose Einstein Condensation of Cavity Polaritons

The exciton-polaritons are two-dimensional quasiparticles of Fabry-Perot-type microcavities with embedded quantum wells, which result from the coupling between excitons (electron and hole pairs bound by Coulomb interaction) in the quantum wells and photon modes of the microcavity. Optical confinement in microcavities helps to achieve the strong coupling regime, when a characteristic anticrossing of the exciton and photon bands takes place, and two exciton-polariton dispersion branches are formed [A. Kavokin, G. Malpuech, Cavity Polaritons, Elsevier, Amsterdam (2003).]. Having extremely light effective masses, the polaritons may condense at the bottom of their lower dispersion branch if they thermalize quickly enough. Bose-condensation is a rare and intriguing physical phenomenon observed at ultra-low temperatures in superconductors, superfluids and atomic gases. Recently, and after about 10 years of efforts, the Bose condensation of cavity polaritons has been reported both at low [J. Kasprzak et al., Phys. Rev. B, 72, 201301, (2005); J. Kasprzak et al., Nature 443, 409, (2006); R. Balilli et al., Science, 316, 1007, (2007); C.W. Lai et al., Nature 450,529, (2007] and room temperature [S. Christopoulos et al. 98, 126405, Phys. Rev. Lett. (2007).]. In this presentation we will present the experimental and the theoretical activities and achievements of this research field as well as the main research directions for the future.

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MS65
Pulsating Fronts in Discontinuous Heterogeneous Media

Abstract not available at time of publication.

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MS65
Modeling of Multi-Step Reactions

We present a derivation of a basic model for multistep reactions with branching. Various assumptions are highlighted and we review results of Gasser & Szmolyan on existence and convergence of traveling profiles for such models.

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MS65
Stability of Fronts

We will discuss orbital stability of a PDE that appears in a combustion problem. This is a joint project with Anna Ghazaryan and Steve Schecter.

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MS66
Stability Characteristics of Highly Nonlinear Internal Solitary Waves

The stability characteristics of an internal solitary wave of depression in a shallow, two or three-layer fluid are investigated experimentally and theoretically. The initial background stratification is varied and it is found that the onset, type and intensity of breaking are dramatically effected by change in the background stratification. The two-layered stratification consists of a homogeneous dense layer below a linearly stratified top layer. In this regime a combination of shear and convective instability is seen on the leading face of the wave. It is shown that there is interplay between the two instability types and convective instability induces shear by enhancing isopycnal compression. In the three-layered regime a linearly-stratified pycnocline separates two homogeneous layers. In this regime, shear instability is seen at the trough of the wave and develops throughout the tail. Experimental results are compared with fully nonlinear theory. Excellent agreement is found in stable cases. In the unstable observations discrepancies between experiment and theory are used to explain the physics observed. Estimates of the wave properties (from experiment and theory) and evaluation of the Richardson number reveal significant new findings.

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MS66
Hamiltonian Long Wave Models for Internal Waves

We derive a Hamiltonian formulation of the problem of a dynamic free interface (with rigid lid upper boundary conditions), and of a free interface coupled with a free surface, this latter situation occurring more commonly in experi-

Thursday, July 24

MS64
Nonlinear Photonics in Waveguides and Microresonators - Part II of II

3:30 PM - 5:30 PM
Room: Marconi Building: Conversi Room

For Part I, see MS56

This minisymposium will cover recent theoretical and experimental advances in the most active areas of nonlinear photonics, where micro- and nano-structures, such as waveguides, photonic crystals and microresonators, are used for the dramatic enhancement and control of nonlinear optical effects. Our speakers will present cutting edge results on supercontinuum and solitons in photonic crystal fibers and nano-wires, Bose-Einstein condensation of cavity polaritons, plasmon-solitons, microlasers and others. The complexity of the underlying nonlinear coupled or partial differential equations provides a considerable mathematical challenge. This forum will create opportunities for applied mathematicians and physicists to drive scientific progress in this booming area.

Organizer: Dmitry Skryabin
University of Bath, United Kingdom
Thorsten Ackemann
University of Strathclyde, United Kingdom

NEW **3:30-3:55 Solitons and Semiconductor Microlasers**
Thorsten Ackemann, Neal Radwell, Yann Tanguy, William J. Firth, Andrew Scroggie, and Gian-Luca Oppo, University of Strathclyde, United Kingdom; Pavel Paulau, Belarussian Academy of Science; Natalia A. Loiko, The National Academy of Sciences of Belarus, Belarus; Roland Jaeger, Ulm Photonics, Germany

4:00-4:25 Bose Einstein Condensation of Cavity Polaritons
Guillaume Malpuech, CNRS, France

4:30-4:55 Switching with Coupled Photonic Crystal Cavities
Bjorn Maes, Koen Huybrechts, Geert Morthier, Peter Bienstman, and Roel Baets, Ghent University, Belgium

5:00-5:25 Modelling of Quantum Dot Microcavities
Massimo Brambilla, Università e Politecnico di Bari, Italy; Ida Maria Perrini, CNR, Italy; Tommaso Maggipinto, University of Bari, Italy

Moved to MS56. ~~**Optical Vortices in Photonic Lattices: Zener Tunnelling and Nonlinear**~~
~~*Anton S. Desyatnikov,*~~

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SIAM Conference on Nonlinear Waves and Coherent Structures

July 21-24, 2008
Università di Roma
"La Sapienza", Rome, Italy

Sponsored by the SIAM Activity Group on Nonlinear Waves and Coherent Structures.

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Announcements

- All conference sessions will take place at the Università di Roma "La Sapienza", Rome, Italy, in the Department of Physics, located at Piazzale Aldo Moro 5 Rome. A map of Università di Roma "La Sapienza" can be found here.
- Wireless Internet access will be available through the university for SIAM attendees. However, for security reasons the current Italian government laws require that a copy of an attendees passport be furnished to gain wireless access to the Internet. Anyone planning to use the wireless connection at the university should send a scanned copy (.ps or .pdf) of their passport to nw08@roma1.infn.it with subject line "**Request Wireless Connection NW08**". Attendees may also present a scanned copy of their passport on-site at the registration desk, however, e-mailing it ahead of time will simplify the process and save time. The organizers appreciate that some attendees may be uncomfortable with this requirement and have tried to simplify the situation, but without success. Please do not hesitate to contact Dr. Claudio Conti (claudio.conti@roma1.infn.it) for any complaint or clarification.
- Information regarding the Multidimensional Localized Structures workshop being held July 18-19, 2008, is available here.

SIAM Conference on Nonlinear Waves and Coherent Structures (NW08)

July 21-24, 2008
Università di Roma "La Sapienza"
Rome, Italy

Organizing Committee

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Mariana Haragus, Universite de Franche-Comte, France
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