

MATHEMATISCHES FORSCHUNGSINSTITUT OBERWOLFACH

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Nonlinear Evolution Problems

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ABSTRACT. The main themes of this workshop were geometric evolution equations and dispersive equations, including nonlinear wave and Schrödinger equations. Altogether there were 21 talks, presented by leading specialists from all over the world.

Mathematics Subject Classification (2010): 35L70, 35Q55, 47J35, 53C44, 74J30.

Introduction by the Organisers

There was a wide spectrum of topics discussed at this year’s workshop on “Nonlinear Evolution Problems” that, however, all can be grouped into the main themes of geometric evolution equations or dispersive equations, including nonlinear wave and Schrödinger equations. Altogether there were 21 talks, presented by international specialists from Australia, Canada, Germany, Great Britain, Italy, France, Switzerland, and the United States. There was a large percentage of female participants in our meeting; five of our speakers were women. Moreover, a number of speakers were only a few years past their Ph.D.

Each morning, three 45-minute lectures were delivered, and on average two in the afternoon, thus leaving ample time for in-depth discussion among the participants of our meeting. This of course meant to make difficult choices; in particular, when different groups of people at our conference had studied and solved the same problem, it was not always easy to decide whom to give the chance to present their work. The final format of our meeting, however, seems to have satisfied everyone present. As a novel feature, moreover, we had asked a group of three specialists

in the study of turbulence to organize an afternoon session, starting with an exposition of the theory of energy cascades and weak turbulence and leading to some more advanced recent results. Also this seems to have been a great success.

In geometric evolution equations, the prominent themes were the Ricci flow, highlighted by Haslhofer's talk on his very recent work with Naber on a definition of weak Ricci flows, harmonic map heat flow, 4-dimensional Yang Mills flow, and the mean curvature flow and their variants, where Rupflin presented the long-sought after global existence result in her work with Topping on Teichmüller harmonic map flow, and where Waldron's talk gave promise that the long-standing problem of global smooth existence for the Yang Mills flow on 4-manifolds might soon be resolved.

The talks by Krieger on stable blow-up in critical nonlinear wave equations and by Dalibard–Roux on the Prandtl equation for boundary layers in fluids confirmed our belief that the many different nonlinear evolution problems discussed at our meetings have many subtle features in common and are amenable to similar techniques. Indeed, in both their work the modulation method of Merle–Raphaël is used that had also been employed by Raphaël–Schweyer in their work on precise blow-up rates and stable blow-up regimes for the 2-dimensional harmonic map heat flow, once again underscoring the importance of a meeting joining these communities.

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