

MATHEMATISCHES FORSCHUNGSINSTITUT OBERWOLFACH

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Partielle Differentialgleichungen

Organised by
Tom Ilmanen, Zürich
Reiner Schätzle, Tübingen
Neil Trudinger, Canberra

July 22nd – July 28th, 2007

ABSTRACT. The workshop dealt with partial differential equations in geometry and technical applications. The main topics were the combination of nonlinear partial differential equations and geometric problems, regularity of free boundaries, conformal invariance and the Willmore functional.

Mathematics Subject Classification (2000): 35 J 60, 35 J 35, 58 J 05, 53 A 30, 49 Q 15.

Introduction by the Organisers

The workshop *Partial differential equations*, organised by Tom Ilmanen (ETH Zürich), Reiner Schätzle (Universität Tübingen) and Neil Trudinger (Australian National University Canberra) was held July 22-28, 2007. This meeting was well attended by 50 participants, including 6 females, with broad geographic representation. The program consisted of 19 talks and 3 shorter contributions and left sufficient time for discussions.

One focus was the combination of nonlinear partial differential equations and geometric problems. There were talks on monotonicity formulas in presence of degenerate singularities and on estimates of the singular set for branched minimal immersions. One striking new result was the proof of the diffeomorphic sphere theorem by the use of Ricci flow.

Many leading experts in the regularity of elliptic and variational problems and in fully nonlinear differential equations occurring in optimal transport and in Hessian equations attended the workshop. Several main contributions were given to this subject. Here, we mention the proof of interior estimates for quadratic Hessian equations in three dimensions, which has been an open problem for several years

of similar relevance as the gradient estimates for the minimal surface equation.

New results were also presented for the Willmore functional. It was achieved to write the Euler-Lagrange equation in divergence form, and the existence of minimizers in fixed conformal classes with certain energy bounds were obtained.

The organisers and the participants are grateful to the Oberwolfach Institute for presenting the opportunity and the resources to arrange this interesting meeting.