Hannes Uecker, Forschung

Einen "anschaulichen" Forschungsüberblick zu Teilen der Angewandten Analysis und Mathematischen Modellierung finden Sie hier. Im Zentrum meiner Forschung stehen: Analysis nichtlinearer partieller Differentialgleichungen, Mathematische Modellierung und Numerische Simulation. Zuletzt bildet pde2path einen Schwerpunkt.
Zur Übersicht möchte ich meine Arbeiten in sechs Gebiete einteilen, mit den neueren Interessen zuerst, und gegenseitigen Überschneidungen.

1. Bifurkation und Musterbildung in PDE Systemen über beschränkten Gebieten, inklusive numerischer Methoden (pde2path), Klassische und erweiterte Modelle aus Physik, Chemie und Biologie. [likeparagraph9, likeparagraph12, likeparagraph13,likeparagraph14,likeparagraph15, likeparagraph16, likeparagraph18, likeparagraph20,likeparagraph22, likeparagraph25,likeparagraph30,likeparagraph likeparagraph43, likeparagraph52,likeparagraph62, likeparagraph65, likeparagraph63, likeparagraph71]

2. pde2path Entwicklung. [likeparagraph76,likeparagraph19, likeparagraph30, likeparagraph31], siehe auch diverse Tutorials

3. Musterbildung in Optimalsteuerung mit PDE Nebenbedingungen. [likeparagraph11, likeparagraph17,likeparagraph22, likeparagraph25]

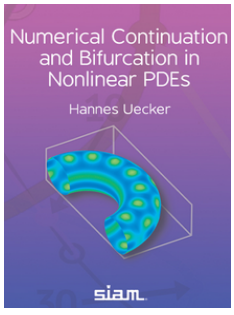
4. Nichtlineare Optik (und andere Probleme, in denen die Nichtlineare Schrödinger Gleichung oder andere Wellengleichungen eine wichtige Rolle spielen) [likeparagraph23,likeparagraph24, likeparagraph26, likeparagraph27,likeparagraph28, likeparagraph40,likeparagraph47, likeparagraph51, likeparagraph57,likeparagraph58,likeparagraph68,likeparagraph73, likeparagraph61]

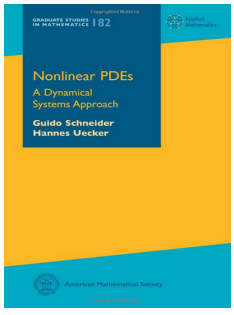
5. Flüssigkeitsströmungen, insbesondere mit freiem Rand über geneigte Ebenen [likeparagraph45, likeparagraph49, likeparagraph59, likeparagraph48, likeparagraph55,likeparagraph53, likeparagraph66, likeparagraph69]

6. Musterbildende Systeme über unbeschränktem Gebiet, in denen vielfach Ginzburg–Landau Gleichungen und verwandte Amplitudengleichungen eine wichtige Rolle spielen) [likeparagraph29, likeparagraph79,likeparagraph33, likeparagraph54,likeparagraph67,likeparagraph64, likeparagraph74, likeparagraph72,likeparagraph75]

Publikationsliste, Stand 19. August 2024. Hinweis: Die verlinkten Preprints können leicht von den publizierten Versionen abweichen.

Bücher





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5. Time-dependent localized patterns in a predator–prey model, *Chaos*, 34, 043143, 2024, (mit F. Al Saadi, E. Knobloch and M. Nelson), preprint

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13. Stripes on finite domains: Why the zigzag instability is only a partial story, *Chaos*, 30, 073104, 2020 (mit A. Shapira und A. Yochelis) preprint

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(This replaces the old version (2016), where the algorithms, applications, and implementations were reviewed in a single document. Now the paper focusses on the algorithms and applications, while the implementation is reviewed in a Tutorial on Hopf bifurcation; see also pde2path tutorials.

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Qualifikationsarbeiten

- Stabilitätsuntersuchungen in einem Modell für Formgedächtnislegierungen, Diplomarbeit, Universität Hannover, 1996. Veröffentlicht als Preprint A3 der Reihe *Spannungs– und Verzerrungsbedingte Phasenübergänge in Ingenieurswerkstoffen*, Forschungsprojekt der VW–Stiftung: I 70 284. pdf

- Rollen und modulierende Multipulse in musterbildenden Systemen, Dissertation, Universität Bayreuth, 2000. (siehe likeparagraph75,likeparagraph74)

- Qualitative Theorie nichtlinearer partieller Differentialgleichungen der Mathematischen Physik, Habilitationsschrift, Universität Karlsruhe, 2004. (kumulativ, siehe likeparagraph73–likeparagraph61, likeparagraph54)

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