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Research Report

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A stability technique
for evolution partial differential
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by Victor A. Galaktionov
and Juan Luis Vázques

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A STABILITY TECHNIQUE FOR EVOLUTION PARTIAL DIFFERENTIAL EQUATIONS

by

Victor A. Galaktionov and Juan Luis Vázques

The book *A Stability Technique for Evolution Partial Differential Equations. A Dynamical Systems Approach* by Victor A. Galaktionov and Juan Luis Vázques, outstanding mathematicians in the field of partial differential equations, introduces a new approach to asymptotic large-time analysis of evolution partial differential equations.

This approach is based on authors' stability result formulated in the abstract setting of infinite-dimensional dynamical systems in an arbitrary metric space.

The new stability theorem states that under certain hypotheses the omega-li:nit set of a perturbed dynamical system is stable under arbitrary asymptotically small perturbations. In contrast to standard methods, the important feature of this theorem is that it imposes the assumptions not on the original equation but on the limit one. After the precise statement and the proof of the abstract stability theorem in the first chapter, further parts of the book deal with various evolution problems described by nonlinear partial differential equations.

The problems analysed include:

- nonlinear heat equations,

- equation of superslow diffusion,

- quasilinear heat equations with absorption,

- porous medium equation with critical strong absorption,

- the fast diffusion equation with critical exponent,

- the porous medium equation in an exterior domain,

- blow-up free boundary patterns for the Navier-Stokes equations,

- equation $u_t = u_{xx}|u \ln^2 u$,

- blow-up in quasilinear heat equations described by Hamilton-Jacobi equations,

- a fully nonlinear equation from detonation theory,

- some other second - and higher - order equations.

Individual chapters of the book provide the self-contained and detailed analyses of the above listed problems.

The large-time behaviour for various partial differential equations is seen in an abstract setting from the unifying point of view of the dynamical systems approach. Owing to the precise mathematical analysis, the broad range of applications, and the extensive references this book is a very valuable position in the field of partial differential equations.

<div align="right">Irena Pawłow</div>

Victor A. Galaktionov and Juan Luis Vázques *A Stability Technique for Evolution Partial Differential Equations.* Birkhäuser Verlag AG, Basel-Berlin-Boston, 396 pages, 2003. ISBN 0-8176-4146-7. Price (net): EUR 108.