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Titolo	Blow-up in nonlinear Sobolev type equations [[electronic resource] /] / Alexander B. Alshin, Maxim O. Korpusov, Alexey G. Sveshnikov
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Altri autori (Persone)	KorpusovM. O SveshnikovA. G <1924-> (Aleksei Georgievich)
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Soggetti	Initial value problems - Numerical solutions Nonlinear difference equations Mathematical physics
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Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Frontmatter -- Preface -- Contents -- Chapter 0 Introduction -- Chapter 1 Nonlinear model equations of Sobolev type -- Chapter 2 Blow-up of solutions of nonlinear equations of Sobolev type -- Chapter 3 Blow-up of solutions of strongly nonlinear Sobolev-type wave equations and equations with linear dissipation -- Chapter 4 Blow-up of solutions of strongly nonlinear, dissipative wave Sobolev-type equations with sources -- Chapter 5 Special problems for nonlinear equations of Sobolev type -- Chapter 6 Numerical methods of solution of initial-boundary-value problems for Sobolev-type equations -- Appendix A Some facts of functional analysis -- Appendix B To Chapter 6 -- Bibliography -- Index
Sommario/riassunto	The monograph is devoted to the study of initial-boundary-value problems for multi-dimensional Sobolev-type equations over bounded domains. The authors consider both specific initial-boundary-value problems and abstract Cauchy problems for first-order (in the time variable) differential equations with nonlinear operator coefficients with respect to spatial variables. The main aim of the monograph is to

obtain sufficient conditions for global (in time) solvability, to obtain sufficient conditions for blow-up of solutions at finite time, and to derive upper and lower estimates for the blow-up time. The abstract results apply to a large variety of problems. Thus, the well-known Benjamin-Bona-Mahony-Burgers equation and Rosenau-Burgers equations with sources and many other physical problems are considered as examples. Moreover, the method proposed for studying blow-up phenomena for nonlinear Sobolev-type equations is applied to equations which play an important role in physics. For instance, several examples describe different electrical breakdown mechanisms in crystal semiconductors, as well as the breakdown in the presence of sources of free charges in a self-consistent electric field. The monograph contains a vast list of references (440 items) and gives an overall view of the contemporary state-of-the-art of the mathematical modeling of various important problems arising in physics. Since the list of references contains many papers which have been published previously only in Russian research journals, it may also serve as a guide to the Russian literature.

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