Prof. Dr. Sc. Sergey M. Frolov
N. N. Semenov Federal Research Center for Chemical Physics
of the Russian Academy of Sciences
4 Kosigin Str., Moscow 119991, Russian Federation

Prof. Dr. Sc. Alexander I. Lanshin
P. I. Baranov Central Institute of Aviation Motors
2 Aviamotornaya Str., Moscow 111116, Russian Federation

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The book contains 29 revised, edited, and formatted articles written by international experts in physical and chemical kinetics, physics of low-temperature and cluster plasma, physics of shock and detonation waves, physics and chemistry of clusters and nanoparticles, combustion and atmospheric chemistry, physics and chemistry of high-speed flow, plasma and laser chemistry, plasma-, laser-, and combustion-assisted technologies. The book provides an overview of the state-of-the-art in these interrelated disciplines and is published in connection with the 9th International Symposium on Nonequilibrium Processes, Plasma, Combustion, and Atmospheric Phenomena held in Sochi, Russia, October 5–9, 2020. The Symposium was dedicated to the 90th anniversary of the P. I. Baranov Central Institute of Aviation Motors, the head organization of aerospace science and technology in the Soviet Union and Russian Federation. The contributions are arranged in two parts: Kinetics, Clusters, and Nanostructures; and Ignition, Combustion, and Power Plants.

The book addresses to practicing engineers and researchers and can serve as a reference book for graduate studies in physics of clusters and aerosol particles, laser and low-temperature plasma physics, combustion, and atmospheric chemistry.

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Preface

The 9th International Symposium on Nonequilibrium Processes, Plasma, Combustion, and Atmospheric Phenomena was dedicated to the 90th anniversary of the P. I. Baranov Central Institute of Aviation Motors, the head organization of aerospace science and technology in the Soviet Union and Russian Federation. The Symposium was held in Sochi, Russia, on October 5 to 9, 2020. The traditional scope of the Symposium topics was:

- kinetics of elementary processes in plasma, combustion, and atmosphere;
- fundamentals of ignition and combustion of organic, metalized, and synthetic materials;
- physical and chemical processes in low-temperature plasma;
- physics of shock and detonation waves;
- ignition, combustion, and detonation in application to jet and internal combustion engines and power plants;
- novel combustion concepts including plasma-assisted and laser-induced combustion;
- physics and chemistry of high-speed gas flows;
- ignition and combustion of gaseous, liquid, and solid fuels in high-speed flows;
- novel physical and chemical propulsion concepts;
- physics of clusters and nanostructures;
- combustion, laser, and plasma generated aerosols and nanoparticles;
- plasma, laser, and combustion assisted technologies;
- gaseous and particulate pollutant formation and pollution control; and
- impact of pollutant emission on the atmospheric processes and climate.

Despite the apparent diversity of the topics and disciplines, they are very closely interrelated. This allowed us to group all submitted manuscripts of international experts in 6 chapters:

- Kinetics;
- Clusters and Nanostructures;
- Ignition and Combustion;
- Engines and Power Plants;
- Shocks and Detonations; and
- Technologies.

This book highlights the state-of-the-art in physics and chemistry of various nonequilibrium phenomena and contains extended bibliography. We have revised and thoroughly edited the contributions and made our best to place them in a logical order. For the sake of convenience, all contributions are accompanied by either English or Russian abstract depending on the language used in the article (Russian or English, respectively). The book also contains the Author index at the end which helps finding the contribution of interest based on the author's name. The authors' affiliations, addresses, and e-mails are also added so that further information can be readily obtained from them.

The Symposium and this volume are the outcome of hard work of several persons, and we highly appreciate their valuable contributions. In particular, we acknowledge the assistance of Ms. Olga Rein and Ms. Tatiana Mikhailova at various stages of Symposium preparation. We thank the staff of TORUS PRESS for their excellent service in organizing the conference and producing this volume.

Special thanks are due to academician O. N. Favorskii and Director General of CIAM M. V. Gordin for their kindly and persistent support of the Symposium. We thank the authors for their time and effort in preparing their manuscripts and participation in the Symposium. We do hope that this volume will serve as a useful addition to the literature on nonequilibrium phenomena.

Sergey Frolov
Alexander Lanshin