Preface

Detonation phenomenon is known mostly due to its destructive consequences of uncontrolled accidental explosions in industry, transportation, pipelines, etc. and due to various types of ammunition designed for destruction. As a matter of fact, this physical phenomenon, when properly controlled, can be successfully used in civil engineering, processing technologies, and transportation because of its elevated thermodynamic efficiency as compared to conventional combustion. The main advantage of detonation over conventional combustion is that the conversion of fuel energy in it provides a high-speed supersonic flow of dense combustion products, capable of producing additional useful work. There currently exist two main schemes of arranging controlled detonations: one with periodic detonations traveling along a combustor (referred to as a Pulse Detonation Combustor) and the other with detonations continuously rotating in a combustor in the plane normal to flow direction (referred to as a Continuous Detonation Combustor). Controlled pulse detonations have been already demonstrated in detonation-assisted thermal spray coating, stamping of sheet steel, annealing of metal shavings, and superfine fragmentation of liquids and powders, as well as intense detonation-induced melting of snow and ice mass, extremely fast water heating, cleaning of steam boilers, and soil drilling. However, the most attractive application of controlled detonations is rocket and air-breathing propulsion, the main subject of ten biannual International Colloquia on Pulsed and Continuous Detonations (ICPCD) we organize since 1998. The important feature of the Colloquia is that in most cases they are jointly sponsored by the Russian Foundation for Basic Research and the U.S. Office of Naval Research. This book is addressed to those who are interested in the most recent accomplishments in this field of science and technology.

Similar to our efforts with previous nine Colloquia, we have endeavored to select, revise, edit, and publish in this volume the condensed articles presented at the 10th (jubilee) Colloquium held in 2016 in St. Petersburg. The book provides an overview of achievements in gaseous, heterogeneous and condensed-phase detonations and their application to propulsion and other fields of human activities. Extended up-to-date

references as well as authors' affiliations are added so that further information can be readily obtained. To make reading more convenient, an author index is provided at the end of the book.

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

Special thanks are due to Academician A. A. Berlin and Prof. S. A. Tsyganov for their kindly support of the Colloquium. We thank the authors for their time and efforts in preparing their articles and participation in the Colloquium and the sponsoring agencies (Russian Foundation for Basic Research, Federal Agency of Scientific Organizations, and Center of Pulse Detonation Combustion) and institutions (N. N. Semenov Institute of Chemical Physics and National Research Nuclear University "MEPhI") for their financial support, without which this endeavor would not be possible. We do hope that this volume will serve as a useful addition to the literature on detonation.

June 2016

Sergey Frolov
Gabriel Roy