
PREFACE

Research and development (R&D) efforts on pulsed detonation engines (PDEs) are continuously gaining momentum that is indicated by the increasing number of publications on the topic world-wide. The PDEs are attractive due to their apparent simplicity and operation on a more efficient nearly constant-volume thermodynamic cycle. It is anticipated that PDEs, when commercially available, will be able to compete with modern gas-turbine propulsion devices and solid propellant engines, particularly in unmanned single-use applications, aircraft afterburners and boosters. However, at this stage of our knowledge, there are still a number of unsolved fundamental issues in pulsed detonation phenomena as applied to propulsion. The major issues are the reliable mixing of fuel with air in a frequently reverberating flow and repeated detonation initiation in liquid fuel sprays with relatively weak on-board ignition sources. Other issues deal with transient heat transfer, on-board energy recovery, controllability of the operating processes at variable flight conditions, integration of diffusers and nozzles, noise, emission, etc. This book is aimed at contributing towards better understanding of the physical and chemical phenomena that govern propagating high-speed deflagrations and detonations, in particular those in PDE demonstrators and in a PDE environment. Written by international experts, this book provides a whole spectrum of R&D approaches and achievements that can be utilized in future propulsion systems operating on high-speed deflagration and/or detonation modes.

This book contains selected contributions presented at the International Colloquium on Control of Detonation Processes held in Moscow, Russia, July 4–7, 2000. The Colloquium was co-sponsored by the U.S. Office of Naval Research (ONR)*, the ONR International Field Office Europe*, European Research Office of the U.S. Army*, Scientific Council on Combustion and Explosion of the Presidium of the Russian Academy of Sciences, and the Russian Foundation for Basic Research. The support of these agencies is acknowledged. The twenty

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two selected papers included in the book were thoroughly revised and edited, and presented in a unified format as book chapters with the “flow” one expects in a textbook. With the extensive reviews and lists of references provided, the book will be useful for researchers and R&D engineers, as well as for faculty and graduate students, involved in this field of science and technology.

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