
PREFACE

Development of propulsion engines operating on continuous and pulse detonations is a subject of growing interest worldwide. The concept of a pulse detonation engine (PDE) is attractive for both subsonic and supersonic flights. In a PDE, detonation is initiated in a tube that serves as the combustor. The detonation wave rapidly traverses the chamber resulting in a nearly constant-volume heat addition process that produces a high pressure in the combustor and provides the thrust. The operation of a multitube PDE at high detonation-initiation frequency can produce a near-constant thrust. The operational cycle of PDE provides a higher thermodynamic efficiency as compared to the Brayton cycle used in gas turbines and ramjets. The advantages of PDE for air-breathing propulsion are simplicity and easy scaling, reduced fuel consumption, and intrinsic capability of operation from zero approach stream velocity to high supersonic flight speeds.

During the period of 1998 to 2004, the U.S. Office of Naval Research* (ONR) and the Russian Foundation for Basic Research (RFBR) have jointly sponsored four international colloquia on detonations, in particular, those aspects of detonations that are directly relevant to the development of PDEs. In 2004, the International Colloquium on Application of Detonation for Propulsion was organized in St. Petersburg. The international scientific community responded enthusiastically with more than 120 participants from 12 countries.

Similar to our previous colloquia efforts, we have endeavored to revise, thoroughly edit, and publish this volume of selected papers presented at the fourth colloquium (2004). The volume is divided into three topical sections: (1) Fundamentals; (2) Continuous Detonation Propulsion; and (3) Pulse Detonation Propulsion. The book provides an overview of the state-of-the-art in application of detonation to propulsion. Extensive 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 volume is prepared as a reference for practicing engineers and research scientists working in the field of combustion and propulsion, and for graduate students studying the disciplines involved.

The colloquium and this volume are the outcome of hard work of several persons, and we appreciate their valuable contributions. We acknowledge the

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