Introduction

The 12th International Colloquium on Pulsed and Continuous Detonations (ICPCD) continues a series of biannual international conferences started in 1998 from the first meeting in St. Petersburg. As a result of these conferences, several books have been published containing condensed papers and full manuscripts of selected papers. This volume includes the selected papers presented at the ICPCD-2020 held in St. Petersburg.

The book is organized with three Chapters: Fundamentals of Gaseous Deflagrations and Detonations (Chapter 1); Fundamentals of Heterogeneous Deflagrations and Detonations (Chapter 2); and Pulsed and Continuous Detonations (Chapter 3).

Chapter 1: Fundamentals of Gaseous Deflagrations and Detonations

Georgievskiy et al. simulate numerically the interaction of a shock wave propagating in a combustible gas with a bubble of inert gas to reveal the effect of the bubble shape and shock strength on shock-to-detonation transition.

Frolov et al. suggest a new experimental method for evaluating the detonability of fuel–air mixtures in terms of the deflagration-to-detonation transition run-up distance and time in a pulse detonation tube and rank various gaseous premixed and nonpremixed explosive mixtures by their detonability under identical thermodynamic and gasdynamic conditions.

Poroshyna et al. perform comparative numerical simulations of the propagation of a one-dimensional (1D) pulsating detonation wave in the periodic nonuniform medium using the shock-attached frame of reference applying explicit, semi-implicit, and implicit algorithms.

Kasimov and Goldin apply the reactive Euler equations to simulate the propagation of a 1D detonation wave in a medium with a varying reactivity modeled by periodic variations of explosive mixture parameters in the upstream state.

Kim et al. investigate numerically the nonlinear dynamics of 1D gaseous detonations propagating into a mixture with initial density variations.

Quintens et al. study experimentally the unsteady wall heat transfer during the propagation of a steady detonation in a cylindrical tube.

Sabelnikov et al. use the two-dimensional numerical simulation to explain the Bellet–Deshayes experiment on the growth of the self-sustaining detonation velocity propagating upstream in the supersonic flow.

Trotsyuk reports the results of a systematic numerical study of the structures and flow regimes in an annular ramjet detonation chamber with a compression body.

Chapter 2: Fundamentals of Heterogeneous Deflagrations and Detonations

Porohyna and Utkin simulate numerically the interaction of a shock wave with a layer of particles attached to the impermeable wall.

Fomin presents the review of the results of the study of explosive and detonation processes in chemically active two-phase bubbly media.

Zagnit'ko et al. develop a fast diagnostic tool for monitoring the two-phase flows with droplets and aerosol particles arising at pulsed injection of liquid fuels into the atmosphere.

Chapter 3: Pulsed and Continuous Detonations

Ivanov et al. present the conceptual design and test fires of a hydrogen-fueled dual-duct detonation ramjet of a new type for a cruising flight speed of Mach 2 at sea level.

Frolov et al. determine experimentally the concentration limits of detonation of ternary propane/methane–oxygen–steam mixtures under normal atmospheric pressure.

Bykovskii et al. study experimentally the continuous detonation of heterogeneous mixtures of aviation kerosene with air in a large-scale annular cylindrical chamber.

Ivanov et al. investigate computationally the influence of waveguide tubes on the signals received by remote pressure sensors measuring pressure histories in pulsed detonation and rotating detonation engines.

Gorbunkov et al. present the results of test fires of an arcjet thruster with self-sustaining oscillations of the arc voltage.

I briefly outlined the contents of the articles included in the book to enable easy selection of the subject of choice by the reader. A quick glance at the book contents indicates that there has been a considerable progress in the detonation research during several years.

Editor