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On the study of the Shuttling Transverse Combustion (STC)

B. C. Khoo
Department of Mechanical Engineering
National University of Singapore
Kent Ridge, Singapore 119260

Abstract

The approach of pressure gain combustion based on continuous detonation combustion, e.g. rotating detonation combustion in an annular chamber, is gathering interest due to its higher operation frequency and thermal efficiency. A novel combustor design of quasi two-dimensional channel, continuous detonation combustion is achieved by repeated reflection of shock waves at two closed ends of the combustor, namely shuttling transverse combustion (STC). STC features similar advantages as the rotating continuous detonation combustion, e.g. smaller scale, one-time ignition and high thermal efficiency. Differently, due to the *quasi-two-dimensional* geometry of combustor, STC promotes a much more straightforward visualization and measurement techniques. It greatly facilitates the investigation of the wave dynamics in great detail because STC shares similar phenomena with rotating detonation combustion such as wave propagation, wave collision originating from counter-rotating wave mode and others. In addition, STC supports less cooling complexity and more compact size for modular design. The current research of STC in TL@NUS, computational and experimental, have involved studies of the flow structure, operation mechanism, wave mode and wave dynamics and operating condition sensitivity etc., which will be discussed in the presentation.