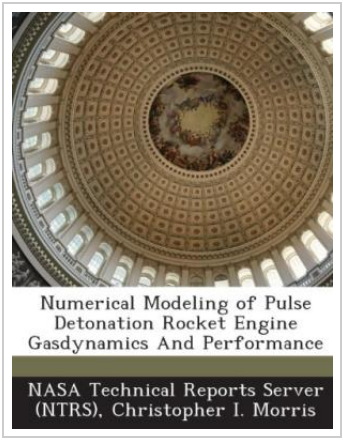

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Numerical Modeling of Pulse Detonation Rocket Engine Gasdynamics and Performance

By Christopher I Morris

Bibliogov, United States, 2013. Paperback. Book Condition: New. 246 x 189 mm. Language: English . Brand New Book ***** Print on Demand *****.Pulse detonation rocket engines (PDREs) offer potential performance improvements over conventional designs, but represent a challenging modeling task. A quasi-1-D, finite-rate chemistry computational fluid dynamics model for PDREs is described and implemented. Four different PDRE geometries are evaluated in this work: a baseline detonation tube, a detonation tube with a straight extension, and a detonation tube with two types of converging-diverging (C-D) nozzles. The effect of extension length and C-D nozzle area ratio on the single-shot gasdynamics and performance of a PDRE is studied over a wide range of blowdown pressure ratios (1-1000). The results indicate that a C-D nozzle is generally more effective than a straight extension in improving PDRE performance, particularly at higher pressure ratios. Additionally, the results show that the blowdown process of the C-D nozzle systems could be beneficially cut off well before the pressure at the end-wall reaches the ambient value. The performance results are also compared to a steady-state rocket system using similar modeling assumptions.

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