

## Documents

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**Analytical Evaluation of Loss Mechanism Effects on PDE Performance with Variation of Refilling Beta Parameters**  
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### Abstract

The present research work is to investigate, how the pulse detonation engine's (PDE) performance is affected by thermodynamic detonation factors. This analysis deals with the evaluation of PDE by using pure fuels like hydrogen, propane, and butane and a blend of hydrogen (50%) + propane (50%), butane (50%) + hydrogen (50%) and propane (50%) + butane (50%). The performance prediction model method is based on flow paths. Performance loss mechanisms, like the refilling process are recognized and enumerated. Inside flow damage, which mostly results from shock waves inside the PDE combustion tube, is a major factor in the PDE's performance degradation. The novelty of the present analysis is to observe that the Hydrogen fuel displays the maximum specific impulse of 7280 s with a detonation velocity of 2321 m/s at the value of beta 0.17. whereas, the lowest specific impulse is produced by butane with the same beta value. © 2023, Semarak Ilmu Publishing. All rights reserved.

### Author Keywords

multicycle PDE; performance loss mechanism; Pure and blended fuels; refilling factor; specific impulse

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