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INVESTIGATION OF PRE-IGNITION PROPELLANT MIXING IN ROTATING DETONATION  
ROCKET ENGINE

**Abstract**

Pre-ignition propellant mixing was simulated using computational fluid dynamics in various rotating detonation rocket engine configurations. The simulations used a 25.4 mm outer combustion chamber wall diameter with different core plug sizes producing a 3 mm, 5 mm, and 7 mm wide annular combustion chamber, as well as a coreless cylindrical 25.4 mm diameter combustion chamber configuration. Four cases for each configuration were simulated, three with similar total mass flow rates and equivalence ratios near stoichiometric, fuel rich, and fuel lean, and the fourth varying total mass flow rate. Mixing was simulated in ANSYS Fluent using a standard