

Supersonic Hot Jet Ignites Ultra-Lean Fuel Mixtures in Combustion Engines

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- Aeronautics
- Mechanical Engineering

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Ultra-lean combustion technologies have been regarded as a potential solution for the engine and power industries to meet the stringent emission regulations including oxides of nitrogen (NO_x). Ultra-lean operation of internal combustion engines can reduce NO_x emissions and improve their thermal efficiency. Unfortunately, ultra-lean combustion has serious challenges. Misfires can occur in the engine as a result of poor ignition. Such misfires and difficulties in ignition can lead to cycle-to-cycle variability, rough operation, reduction in efficiency, and increase in unburned hydrocarbon emissions, none of which are desirable. A solution to these problems would allow for the operation of internal combustion engines with reduced NO_x emissions and improved engine thermal efficiency.

Researchers from Purdue University have developed a technique to generate supersonic hot turbulent jets that can ignite ultra-lean fuel/air mixtures, which may not be able to ignite using current pre-chamber technologies. The supersonic hot jet makes it possible to burn ultra-lean mixture in combustion engines through the use of converging-diverging nozzles with a certain aspect ratio in the pre-chamber. Supersonic jet ignition improves combustion efficiency, reduces NO_x emissions, and increases fuel economy.

Advantages:

- Improves combustion efficiency
- Reduces NO_x emissions
- Increases fuel economy

Potential Applications:

- Gas engine manufacturers
- Power supply industries

People:

- Qiao, Li (Project leader)
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Intellectual Property:

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