Within-A-Cycle Control of Rate Shaping with Piezoelectric Fuel Injectors

A closed-loop controller for piezoelectric fuel injectors optimizes injection flow rate, significantly reducing fuel consumption and harmful emissions in diesel engines.

Fuel injection rate shaping is a strategy to improve fuel efficiency and reduce harmful emissions in diesel engines. Thanks to their fast response, piezoelectric fuel injectors are capable of rate shaping.

Researchers at Purdue University have developed a model-based, closed-loop controller of injection flow rate for a piezoelectric fuel injectors. This within-a-cycle control strategy utilizes a model-based, generalizable scheme and shows an injection flow rate tracking capability. The performance of this controller has been verified with simulation and experimental results at different rail pressures and desired injection rates, which indicate a maximum error of total fuel per one injection event of 2.5 percent.

Advantages

-Reduction in fuel consumption and emissions

-Dynamic surface control scheme minimizes computational effort

Potential Applications:

-Automobile industry

TRL: 6

Intellectual Property:

Utility Patent, 2014-08-01, United States

Keywords: Fuel injection rate shaping, piezoelectric fuel injectors, closed-loop controller, injection flow rate, diesel engines, fuel efficiency, emissions reduction, dynamic surface control, automobile industry, flow rate tracking capability

Technology ID
2014-SHAV-66737

Category
Automotive & Mobility Tech/Fuel Injection & Combustion Control Systems
Automotive & Mobility Tech/Internal Combustion Engine Optimization

Authors
Dat Duc Le
Bradley Pietrzak
Gregory Shaver

Further information
Will Buchanan
wdbuchanan@prf.org

View online