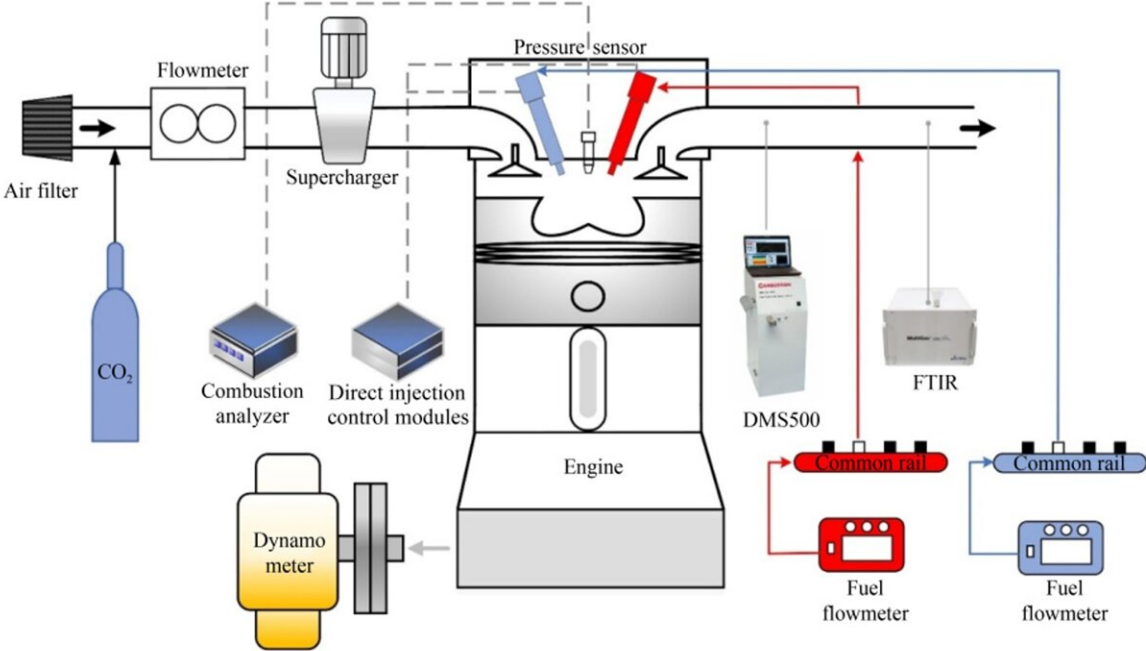


Methodology for regulating fuel stratification and improving fuel economy of GCI mode via double main-injection strategy

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Schematic of experimental setup. Credit: Higher Education Press

Exploring advanced combustion mode with high efficiency and low emissions has been the dream of successive generations of researchers. Conventional diesel engines have high compression ratios thus with thermal efficiencies of 35%–45%, but the diffusion combustion

characteristics of diesel make NO_x and soot emissions high.

Gasoline compression ignition (GCI) is an advanced [combustion](#) mode in the field of internal combustion engines, which combines the advantages of the high efficiency of [diesel](#) engines and the low emissions of gasoline engines. Although the GCI mode can achieve a [high efficiency](#) while maintaining low NO_x and soot emissions, the GCI combustion still faces problems such as high maximum pressure rise rate (MPRR) and combustion deterioration at high loads.

Yong Qian's research group from Shanghai Jiao Tong University proposes a new methodology to improve the problems of high MPRR and combustion deterioration of the GCI mode at high loads. The new methodology is called double main-injection (DMI) strategy. Their findings were published in *Frontiers in Energy* on Jan. 10, 2023.

By comparing DMI strategy with the single main-injection (SMI) strategy and conventional diesel combustion at high loads, they found that:

1. The simultaneous main-injection of the two direct injectors can achieve a rapid fuel supply and control of fuel stratification in the DMI mode.
2. Exhaust gas recirculation has a significant effect on the combustion and emissions of the DMI mode.
3. The DMI strategy achieves a highly efficient and stable combustion of the GCI mode.
4. The DMI strategy can alleviate the requirement of the GCI mode on injection pressure and improve the problems of high MPRR and combustion deterioration.

The proposed [new methodology](#)-DMI strategy can improve the [fuel economy](#) and reduce MPRR at high loads, and it is of great significance

to GCI mode.

More information: Haoqing Wu et al, A methodology for regulating fuel stratification and improving fuel economy of GCI mode via double main-injection strategy, *Frontiers in Energy* (2023). [DOI: 10.1007/s11708-022-0859-z](https://doi.org/10.1007/s11708-022-0859-z)

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