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Fluid dynamic investigation of innovative intake strategies for multivalve internal combustion engines

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Abstract

The aim of the paper is to investigate the influence of novel opening strategies for intake valves on the permeability and in-cylinder flow of a multivalve spark-ignition internal combustion engine. Specifically, the deactivation of an intake valve and asymmetric valves lifts are analysed and compared to the standard symmetric valves opening.

To this purpose, a computational fluid dynamic (CFD) analysis is performed by using a finite volume code and an experimental activity is done at a steady flow rig.

The investigation is carried out for different intake strategies and engine load conditions and the comparison between CFD and experimental flow coefficients shows a good agreement.

The results demonstrate that the proper combination of different valves strategies permits the effect of the throttling process at medium and low engine load to be minimised, improving the breathability of the intake system, and creating more organised and energised mean flow structures within the combustion chamber.

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