Preliminary experimental analysis of a porous injector

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Abstract
Liquid fuels are commonly used in combustion systems such as burners, gas turbine, jet engine, rockets etc. In order to achieve low pollutant emissions and high combustion efficiency, the liquid fuel has to be finely atomized and dispersed. Nowadays environmental regulations place stringent restrictions on pollutant emissions such as carbon monoxide (CO), nitrogen oxides (NOx), particulate matter etc., thus the exploration of fuel injection technologies able to improve fuel atomization are of current interest.
The use of a porous element to inject and atomize the fuel has been recently investigated for application to scramjets [1], liquid rocket engine [2], gas turbine [3] and internal combustion engine [4], just to cite a few. This work reports some preliminary results on a porous injector designed at Politecnico di Milano and currently under study, the injector is composed by a cylindrical element made of porous aluminum. Differently from other porous injectors [1-4], a two phase flow occurs inside the porous material. Preliminary experimental results evidence the atomization process to depend on both liquid and air flow rates; moreover pressure losses are significant and they increase by increasing the porous injector length, the liquid flow rate and the air flow rate. Further experimental analysis are required to characterize the atomizing quality of the injector.

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