Clean Burner-combustion of Fire-resistant Fuels

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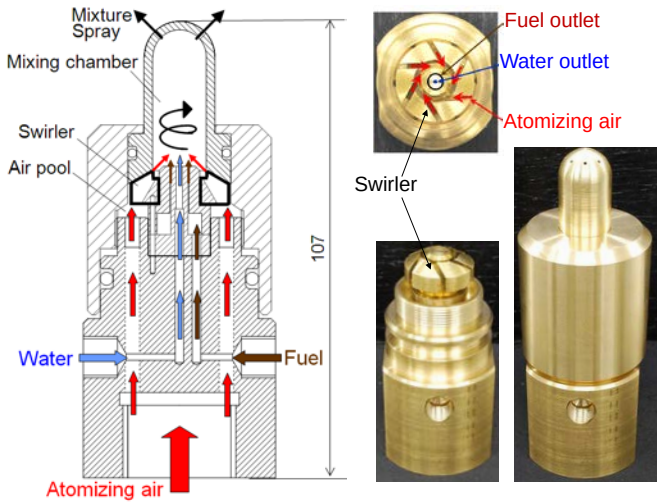

Fig.1 Fuel-water internally rapid mixing type of injector

Fuel100% Water 50vol%

Fig.2 Burner flame

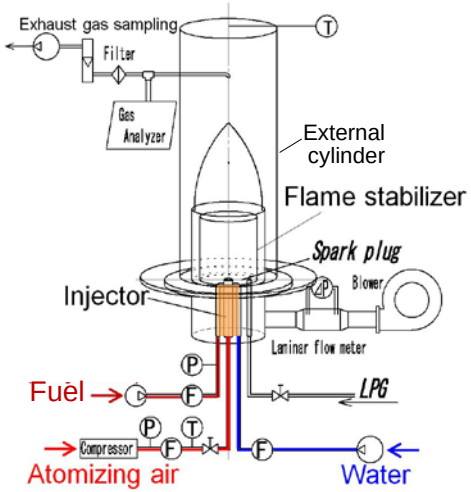

Fig.3 Experimental setup of burner combustion

Content:

Water addition to combustion field is known effective to reduce NOx and soot emissions simultaneously for fire-resistant fuels. Therefore, water-emulsified technology has been used in burner combustion. However, water-emulsified fuel needs fuel-manufacturing process. In this process, some surfactant is required to prevent separation of oil from water, which leads to an increase in cost of the fuel; further, the fuel also has problem of time stability as fuel.

This study tries to use water directly in burner combustion with a newly developed injector shown in Fig. 1. Fuel and water are separately supplied to the injector. The supplied fuel and water are rapidly mixed with support of pressurized swirling air in a small chamber inside the injector. The well-mixed fluids are injected into combustion field from several small holes on the top of the chamber. The flow ratio of water to fuel can be easily adjusted in response to combustion condition. Low emission combustion achieved by this injector enables high load operation, which leads to high combustion efficiency with less thermal loss of exhaust gas.

Keywords:
Fire-resistant fuels, Burner combustion, Fuel-water mixing type of injector

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