

Ignition and combustion of diluted hydrogen mixtures in a flow past an array of catalytic wires

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Abstract. *In this paper we study the heat transfer and heterogeneous combustion problem of the flow of a reacting mixture (in this case we address the case of hydrogen/oxygen mixtures) flowing through an array of catalytic wires. The fluid velocity, vorticity, temperature and species concentration of the reactants have been obtained for different flow Reynolds numbers and for a Prandtl number of 0.72. The flow Reynolds number based on the wire separation is assumed to be small but not larger than 40. We have obtained the ignition temperature of the surface reactions as a function of the Peclet number for the case of a wire radius of $a = 0.02$ cm. and a wire separation of $l = 0.1$ cm. The required wire temperature increases with the Peclet number, beginning with a critical Peclet number of 0.056 corresponding to the auto-ignition condition (ignition at room temperature).*