Propagation of hydrogen-air and acetylene-air flame in a channel with porous partition

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The propagation of hydrogen-air and acetylene-air flame in a channel with porous partition was experimentally studied. To minimize the effect of the unburned mixture flow caused by the expanding combustion products, both ends of the channel were open, and the mixture was ignited near one of the open ends of the channel. Thus, ahead of the flame front, the velocity of the unburned mixture was significantly lower than the velocity of the flame front. Polyurethane foams with open pores and with 10, 30, 45 and 80 pores per inch were used, which are characterized by a low thermal conductivity, and heat losses to the combustion rate is insignificant. The flame front velocity was measured before and after the porous partition. It was shown that the length of the polyurethane partition determines flame propagation mode: subsonic acceleration up to 200 m/s, transonic and supersonic combustion (200-600 m/s) and flame deceleration. The flame front acceleration was characterized by the fact that the flame velocity increases exponentially with the increase of the porous partition length. The corresponding exponent power factor are given.

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