ON THE POSSIBILITY OF DETERMINING THE STRUCTURE AND RATE OF GAS FLOW IN THE RAPID COMPRESSION MACHINE BY ANALYSIS OF THE MOTION OF BURNING PARTICLES

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Abstract: A method for flow visualization in the test chamber of rapid compression machine by analyzing the velocities of the burning fine particles is proposed. It is shown that carbon 20–32-micron particles are easily ignited in a hot air and their movement corresponds to the roll-up vortex caused by the travelling piston during the compression stroke. From the particles motion, the variation in time of the radial velocity projections distribution of gas flow along the radius of test chamber was obtained. Such data processing gives information on the formation dynamics of the vortex and estimates it approximate scale. The method can be used when optimizing the inside aerodynamics of the rapid compression machine by changing the piston or combustion chamber design.

Keywords: rapid compression machine; roll-up vortex; burning particles; visualization

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