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Airflows Induced by Asymmetric Bipolar Voltage Pulses in Dielectric Barrier Discharge Plasma Actuator JUNYA SUZUKI, MASANORI DEGUCHI, YOSHINORI TAKAO, KOJI ERIGUCHI, KOUICHI ONO, Department of Aeronautics and Astronautics, Kyoto University — Dielectric barrier discharge (DBD) plasma actuators have recently been intensively studied for the flow control over airfoils and turbine blades in the fields of aerospace and aeromechanics. The unidirectional gas flow (main flow) is assumed to be induced by the electrohydrodynamic (EHD) body force, where the ambient gas flows are also induced, depending on operating parameters of the discharge such as voltage waveform and amplitude, electrode size and configuration, and dielectric thickness and permittivity. This paper presents experimental studies of airflows in DBD plasma actuators, induced by employing asymmetric bipolar voltage pulses. Schlieren and ICCD imaging exhibited that a variety of flows such as a reverse directional flow, a vortex flow, and a combination of them occur at the opposite side of the main flow, which correlates with the dynamic behavior of DBD plasmas being established.

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