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Effect of the voltage waveform on induced flow of a dielectric barrier discharge plasma actuator NAOHIKO SHIMURA, MOTOFUMI TANAKA, HIROYUKI YASUI, Power and Industrial Systems R&D Center, Toshiba Corporation — Flow control technique using surface plasma is attracting a lot of attention because of its ability to be the innovative technology for the wide range application. In this paper, we have conducted experiments to inspect relationship of velocity of the induced flow, frequency and voltage of power source. First, when sinusoidal voltage was applied between the electrodes, the result showed the induced flow was the faster, the greater the power was, regardless of the frequency and voltage. Then, the waveform was changed to bipolar pulse with shorter ON period than that of sine wave with a frequency of 3 kHz, almost the same induced velocity was observed at the same power, regardless of the voltage waveform. By the same experiment with a frequency of 10 kHz, the relationship of induced velocity and the power was affected by the waveform unlike the case of frequency at 3 kHz. The highest induced velocity was observed in case of sine wave. Induced velocity was able to be expressed as a function of the full width half maximum of voltage waveform, under constant power. From these facts, it is believed that it is required for external electric field to be applied for more than certain period of time in order for ions to be accelerated by electric field even in a case that almost same amount of ions were generated under an almost same condition of discharge power.

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