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A time-resolution study of converging point of atmospheric microwave plasma[1] CHUJI WANG, PING-REY JANG, NIMISHA SRIVASTAVA, SUSAN SCHERRER, Mississippi State University, Starkville, MS, THEODORE S. DIBBLE, State University of New York, Syracuse, NY, YIXIANG DUAN, Los Alamos National Lab, NM — Extensive studies on atmospheric microwave induced plasma or microwave plasma torch have been reported in literature. One of the well-known phenomena created in such a plasma is the existence of a converging point in the plasma plume. It is widely published in literature that this converging point divides a plasma plume into two distinctive regions for plasma diagnostics and applications and that the location of the converging point on the axis of the plume depends on gas flow rates at a given plasma power. We investigated the plasma generation and the plasma plume dynamics using a time-resolution imaging. It was found for the first time that the converging point is actually a time-averaged visual effect and does not exist at all when the plasma plume is examined under high time-resolution, e.g., <1 ms. Images of the plasma, which operated at 120 W with a central and supporting argon gas flow rates of 1.0 and 0.5 lpm, respectively, were digitally captured at different time-resolutions, ranging from 1 to 600 μs. A tentatively gas glow dynamic model was proposed to interpret the phenomenon.

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