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Title:A one-dimensional propagation of shock wave supported by atmospheric millimeter-wave plasma

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Abstract:A shock wave supported by an atmospheric breakdown plasma caused by a high-power millimeter-wave beam was studied. The shadow graph image in a shock tube visualized the one-dimensional shock-wave generated by the millimeter-wave breakdown in atmosphere for the first time. It was revealed that a normal shock wave propagated through the tube at the constant velocity while it was detached from the ionization front of the plasma whenever the propagation velocity of the ionization front was supersonic or subsonic. And it was visually clarified that the atmospheric millimeter-wave breakdown had the combined structure of the normal shock wave and the heating region of the millimeter-wave plasma. The measured pressure of the shock front was as equal as the normal shock which propagated at measured Mach number. &copy; 2011 Springer Science+Business Media, LLC.