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Modification of Townsend Breakdown Theory for investigating the High-Power Microwave Propagation in the Atmosphere

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The Townsend breakdown theory is generally applicable in the case in which a DC voltage is applied to a gap filled with gases. The result of Townsend breakdown theory is generally not applicable directly in the case in which a high-power microwave propagates in the atmosphere. In this paper, we develop a theoretical model to describe the breakdown of high-power microwave propagation in the atmosphere, which is a modification of the Townsend breakdown theory. The result of the new model shows that there is a minimum air pressure at which the breakdown threshold reaches the minimum value when the high-power microwave propagates in the atmosphere under certain conditions. The result of the present paper is of importance to the high-power microwave area and may be to the investigation of RF breakdowns in gases.

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