Abstracts

Measured Noise Temperature Versus Theoretical Electron Temperature for Gas Discharge Noise Sources

K.W. Olson. "Measured Noise Temperature Versus Theoretical Electron Temperature for Gas Discharge Noise Sources." 1968 Transactions on Microwave Theory and Techniques 16.9 (Sep. 1968 [T-MTT] (Special Issue on Noise)): 640-645.

In the past, measured noise temperatures T/sub n/ of a few commercially available gas discharge noise sources were indicated as agreeing with the predicted electron temperature T/sub e/ of the positive column based on the von Engel and Steenbeck relationship. Data were taken over the past 2 years on argon tubes over a pressure range of 5 to 40 mm and on neon tubes at 20 mm, with current variations from 100 to 300 mAdc. These data were compared against predicted electron temperatures. For the argon tubes at pressure-radius products greater than 20 mm/spl dot/cm there appeared to be reasonable correlation between the measured noise temperature and the predicted electron temperature although it is suggested that this correlation was fortuitous. For argon pressure-radius products less than 20 mm/spl dot/cm the measured noise temperature was as much as 15 percent lower than the predicted electron temperature. For neon tubes at 20-mm pressure, with the same variation in tube radius, and for pressure-radius products less than 24.0 mm/spl dot/cm, the measured noise temperature differed even more than for argon from the predicted electron temperature. A difference of as much as 30 percent at a pressure-radius product of 3.0 mm/spl dot/cm was observed. A qualitative explanation for argon is presented based mainly on the fact that these discharges do not have a Maxwellian distribution of electron velocities nor a velocity independent electron collision frequency. For neon the wide variation was not understood.

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