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Analysis of Peak Output Voltage and Droop from a Nonuniform Transmission Line

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Nonuniform transmission lines are widely used as impedance transformers in pulsed power systems such as Z-pinch drivers. The transmission characteristics of the nonuniform line are important issues for the system. As the characteristic impedance varies along the nonuniform transmission line, it is difficult to investigate the transmission characteristics using analytical methods.
In this paper, a mathematical expression of the output voltage from the nonuniform transmission line with an arbitrary input pulse was deduced. It is an extension of the mathematical expression we proposed two years ago[1], which is just for a half-sine input voltage wave. The peak-value of the output voltage with a half-sine input voltage wave and the droop of the output voltage with a rectangle input voltage wave were further investigated by the analytical analysis of the new mathematical expression.

[1] C. Mao, X. Zou, and X. Wang, "Analytical solution of nonuniform transmission lines for Z-pinch,"IEEE Transactions on Plasma Science, vol. 42, pp. 2092-2097, August 2014.

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