Abstracts

Studies in Overhead Wire--Goubau Line Above Ground

J. Chiba. "Studies in Overhead Wire--Goubau Line Above Ground." 1977 Transactions on Microwave Theory and Techniques 25.2 (Feb. 1977 [T-MTT]): 83-93.

The transition theory which Kikuchi proposed first was improved and expanded in the range of the Sommerfeld line above ground and even the Goubau line (G line) above ground. Then it was proved by the experiment with the aid of the G line. The solution for the electromagnetic field produced by an overhead wire is derived using Maxwell's equations and treating the situation as a boundary value problem. In particular, the integrals which are caused by the finite conductivity of the earth and which are responsible for the distribution of the fields in the neighborhood of the surface of the earth are evaluated by means of the saddle-point method. Based on the field theory described above, the primary transmission line constants of the G line above ground (R, L, C, and G) and the secondary transmission line constants (gamma/sub 0/ = alpha/sub 0/ + j beta/sub 0/ and Z/sub 0/) were obtained, and then the equivalent circuit for the G line above ground was given. The behavior of the line from an engineering standpoint is now completely determined by the usual simple circuit theory. The transition of the G line from a ground return transmission line of a surface-wave transmission line was proved experimentally.

❑ Return to main document.