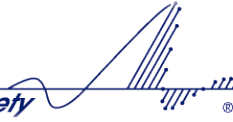ELEKTROTEHNIČKI FAKULTET UNIVERZITETA U BEOGRADU I
IEEE SCG SECTION, CAS-SP JOINT CHAPTER ORGANIZUJU

PREDAVANJE

Surge Impedance of Transmission-line Towers: C. A. Jordan's Formula
Predavač
Prof. Kohshi Okumura (Senior Member IEEE)
Visiting Professor, IRMACS, Simon Fraser University, Vancouver, BC, Canada
Elektrotehnički fakultet, 15.09.2010, 13:00, sala 61

Abstract:

The surge impedance of transmission-line towers is very important in the design of electric transmission lines. The surge impedance has similar effect as a resistance in direct current circuits. Large surge impedance implies large voltage between the terminals determined by Ohm's law. When designing transmission lines, engineers need to estimate the surge impedance of the tower in order to estimate voltage of the tower top when the top is struck by lightning carrying huge currents. The large voltage at the tower top causes flush-over phenomena from the tower arm to the transmission lines. Eventually, travelling wave carrying huge electric power penetrates into substations and damages various equipment such as transformers. Finally, there is electric blackout on a large scale.

In 1934, C. A. Jordan proposed a formula to calculate the surge impedance of transmission-line towers. The formula is well known, has been cited even in textbooks, and has been used by many researches and engineers for over 50 years. However, the formula is erroneous. Where did C. A. Jordan make a mistake? In this talk, we derive the formula and identify the mistake made. Furthermore, we provide the correction and a slightly better approximation by taking into account the structure of the transmission-line tower.

About speaker:

Kohshi Okumura graduated from the Department of Electrical Engineering, Kyoto University, Japan in 1966. He received the doctoral degree in engineering from Kyoto University in 1974.

He held Instructor, Lecture, and Associated Professor positions in the Department of Electrical Engineering, Kyoto University. He has been Full Professor since April 1992. In April 2004, he became Full Professor at Hiroshima Institute of Technology and Professor Emeritus at Kyoto University. From 1989 to 1990, he was a guest researcher at University of London (Queen Mary College), United Kingdom and at Ulm University, West Germany under the support of the Ministry of Education of Japan.

He is a Fellow of the Institute of Electronics, Information and Communication Engineers (IEICE) and a Senior Member of the IEEE Circuits and System Society. He served as a Vice President of the Institute of Electrical Engineers of Japan (IEEJ).

His areas of research are the analysis of nonlinear circuits as well as the surge phenomena of transmission systems. He is interested in the application of mathematics to nonlinear circuit analysis, such as interval analysis, homotopy and multi-scale methods.

Branimir Reljin, *Senior Member IEEE*, IEEE SCG CAS-SP Chair, Organizer and General Chair of the NEUREL Symposia

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