

EMI Coupling to Cable Bundles

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This work consists of two parts. In a first part, the different analytical, numerical and experimental methods employed in the study of electromagnetic interference on cable bundles inside an enclosure such as an aircraft are reviewed and critically compared, in order to determine the best available tools to predict the influence of EMI on signals propagating along the conductors in the bundle. The study is conducted in the frequency domain, and takes into account a variety of parameters including the effectiveness of insulating materials and metallic screens, the position of the cable bundle with respect to floor and walls of the platform, the presence and state of operation of neighboring bundles. Both deterministic and statistical approaches are examined. The scattering parameters of conductor pairs inside the bundle are analyzed.

In a second part, a detailed study is conducted on the influence of an external field on the propagation of signals inside a multi-conductor cable, by utilizing a distributed Green's function approach akin to that proposed by Schelkunoff (*Electromagnetic Waves*, chapter 7. New York: Van Nostrand, 1943) and previously utilized by Uslenghi and Bridges (*Alta Frequenza*, vol. 49, no. 2, pp. 172-178, 1980) to study the penetration of electromagnetic fields through the shield of a coaxial cable. The incorporation of these results into an extension of the BLT equation is considered.