# An Efficient Method of Calculating Signal Correlation in Lossy Dipole Arrays Based on Equivalent Circuits

**Author(s) - Institution(s):**
Hui, Li, Lund
Xianqi, Lin, KTH
Buon Kiong, Lau, Lund
Sailing, He, KTH

**Corresponding author email:** bkl@eit.lth.se

**Corresponding WG group:** SWG1.1

**Abstract:**

Correlation coefficient, as a critical performance metric of multiple antenna systems, can be calculated from the 3D radiation patterns of the antennas for multipath environments with uniform 3D angular power spectrum. A simpler, faster and lower cost approach uses the antennas' scattering parameters to determine correlation coefficient. However, the method assumes lossless antennas, and hence only achieves good accuracy for antennas with high radiation efficiencies. In this work, a method for calculating correlation coefficients in lossy dipole arrays is proposed, using only the scattering parameters and radiation efficiencies. The method is based on the equivalent circuit of antennas, and it gives a significantly better estimate of the correlation coefficient than the existing methods. The proposed method is not limited by the number of antenna elements, which is demonstrated by applying it to a four-element dipole array.