

# EMC diagnostics of complex radio systems by the use of analytical and numerical worst-case models for spurious couplings between antennas

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2016

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**Keywords:** complex ground-based radio systems, two-phase EMC diagnostics.

**Abstract:** A technique of two-phase EMC diagnostics of complex ground-based radio systems with the use of worst-case models of electromagnetic spurious couplings between antennas is introduced. At the first phase, the ultra wideband analytical model of antenna coupling developed in the framework of IEMCAP program is used, and the ensemble of potentially dangerous spurious couplings is found. For these couplings, the improved numerical worst-case models for the reduced frequency bands, as well as for given types, orientations, and relative positions of the antennas are developed at the second phase of EMC

diagnostics. Each of these improved models is obtained by finding the envelope of results of multiple (based on variations of model parameter values) FDTD modeling of the corresponding coupling. The example of application of the introduced technique for diagnostics of intrasystem EMC of an operating radio-TV complex is provided: the computer model of its radio mast is developed, and the two-phase EMC diagnostics of this complex (which contains radio equipment of more than 20 systems of radio-TV broadcasting, fixed and mobile radio communication, radio navigation, and other services) is performed. The obtained results have confirmed the efficiency of the presented technique for the analysis of intrasystem EMC due to significant improvement in estimation of potentially dangerous spurious couplings between antennas at the second phase of EMC diagnostics (by 5...20 dB in comparison with analytical model of IEMCAP) with acceptable computational burden.

**Publication source:** EMC diagnostics of complex radio systems by the use of analytical and numerical worst-case models for spurious couplings between antennas / V. Mordachev [et al.] // International Symposium on Electromagnetic Compatibility - EMC EUROPE, Wroclaw, 05-09 September 2016. – Wroclaw, 2016. – P. 608–613. – DOI: 10.1109/EMCEurope.2016.7739218.