DNA EMC technology and software are used successfully

- in our novel cost-effective technique “EMC Virtual Testing Area” (EMC VTA) for EMC analysis of complicated spatially-distributed complexes of radio systems allocated at the ground / sea surface and / or in the air space
- in our original and powerful specialized expert system “EMC-Analyzer” for cost-effective EMC analysis and design in complex co-site complexes of radio- and electronic systems and/or in spatially-limited ground/water complexes of radio systems;
- in our famous “Automated Double Frequency Test System” (ADFTS) for behavior simulation of receiver-under-test operation in severe EME (the model of the receiver is extracted from ADFTS measurements);
- in a lot of projects on EMC analysis and design for the land and on-board radars, radio equipment of airports, land stations of space vehicles control, radio objects of different functionality and services, etc. (more than 100 projects).

More information about DNA EMC is given in the following papers:

1. Mordachev V., Express analysis of electromagnetic compatibility of radio electronic equipment with the use of the discrete models of interference and fast Fourier transform, Proc IX International Wroclaw Symposium on EMC, Poland, Wroclaw, 1988, part 2, pp.565-570.
2. Loyka S., Mosig J., “New Behavioral-Level Simulation Technique for RF/Microwave Applications. Part I: Basic Concepts”, International Journal of RF and Microwave Computer-Aided Engineering, vol. 10, no. 4, July 2000, pp. 221-237.
3. Mordachev V., Sinkevich E. Discrete technology of electromagnetic compatibility analysis at the system level: features and applications overview.- Proceedings of the International conference on metrology and measurement “ICMM 2007”, Vol.1, Beijing, September 5-7, 2007, pp.57-63.
4. Mordachev V., Sinkevich E. "Virtual Testing Area" for Solving EMC Problems of Spatially Distributed Radiosystems based on Automated Double-Frequency Test System // Proceedings of the 9-th International Symposium on EMC “EMC Europe 2010” joint with 20-th International Wroclaw Symposium on EMC, Poland, Wroclaw, Sept. 13-17, 2010, pp.714-720.
5. Sinkevich E., Mordachev V. Characterization of Radio Receiver's Front-End Nonlinearity by Measurement of Spurious-Free Dynamic Ranges, Proceedings of the 11-th Int. Symp. on EMC “EMC Europe 2012”, Rome, Italy, Sept. 17-21, 2012, 6 p.

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DNA EMC

Discrete Nonlinear EMC Analysis

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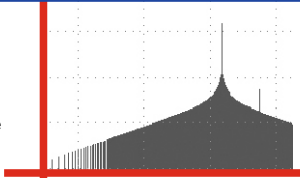


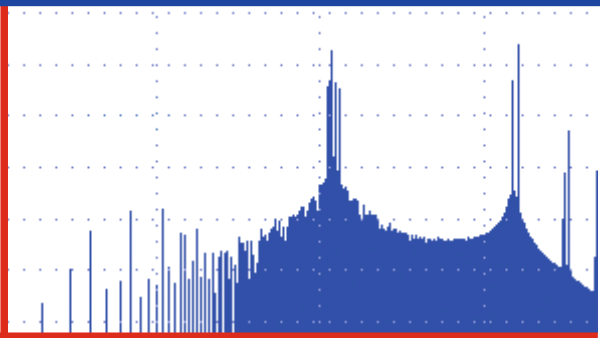
DNA EMC is a leading and extra-highly efficient technique and software for nonlinear behavior simulation of radio receiver operation in severe electromagnetic environment (EME)

DNA EMC is especially useful and effective for EMC analysis and design, when a lot of powerful out-of-band signals are observed

DNA EMC peculiarities are: the use of discrete models of EME, high-order models of radio receiver's amplitude and phase nonlinearities, and Fast Fourier Transforms (FFTs)

DNA EMC is fully tested in more than 100 projects on EMC analysis and design for different sets of radio systems of different radio services (fixed and mobile communication, radar, radio navigation, broadcasting, etc.) at the radio receiver input

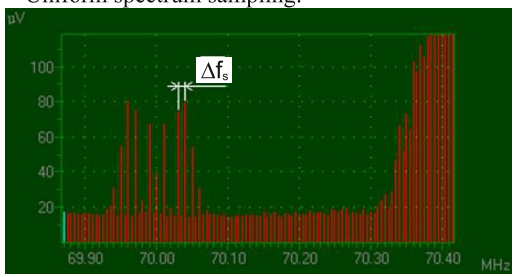
The highest efficiency and accuracy of EMC analysis in severe electromagnetic environment !



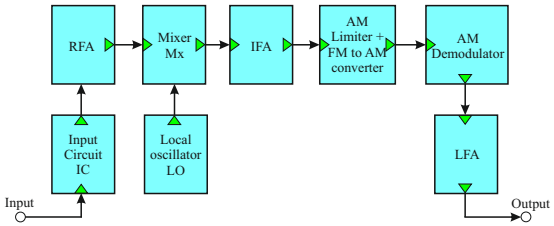
Discrete Nonlinear EMC Analysis

Fundamental principles

- Uniform spectrum sampling:



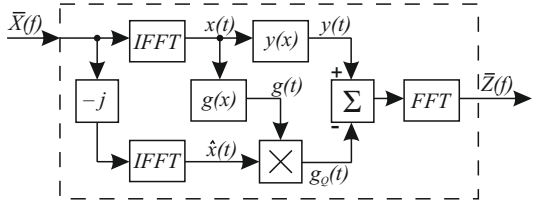
- Receiver representation as a serial-parallel unidirectional structure containing linear filters and memoryless nonlinearities:



- Simulation of the linear filters in the frequency domain
- Simulation of the memoryless nonlinearities in the time domain
- Application of the FFT to pass from the frequency domain to the time domain and vice versa

DNA EMC expansion for AM-PM simulation: instantaneous quadrature model

- is a development of the memoryless nonlinearity model
- designed for simulation in a wide frequency band
- takes into account both AM-AM and AM-PM nonlinearities
- can predict both odd- and even-order nonlinear products



Main advantages

1 Extra-high computational efficiency: the computational advantage of DNA EMC over traditional techniques grows rapidly with increase of EME complexity and nonlinear effects' order

2 Computational efficiency is independent on the number of input signals: DNA EMC can be used for EMC in an extremely severe EME formed by many thousands of modulated signals of different radio services (communication, radar, broadcasting, etc.);

3 Account for the combined influence of all major types of linear (gain, attenuation, filtering) and nonlinear effects (intermodulation, desensitization, cross-modulation, reciprocal mixing, AM-AM and AM-PM conversion, spurious responses) in radio receiver

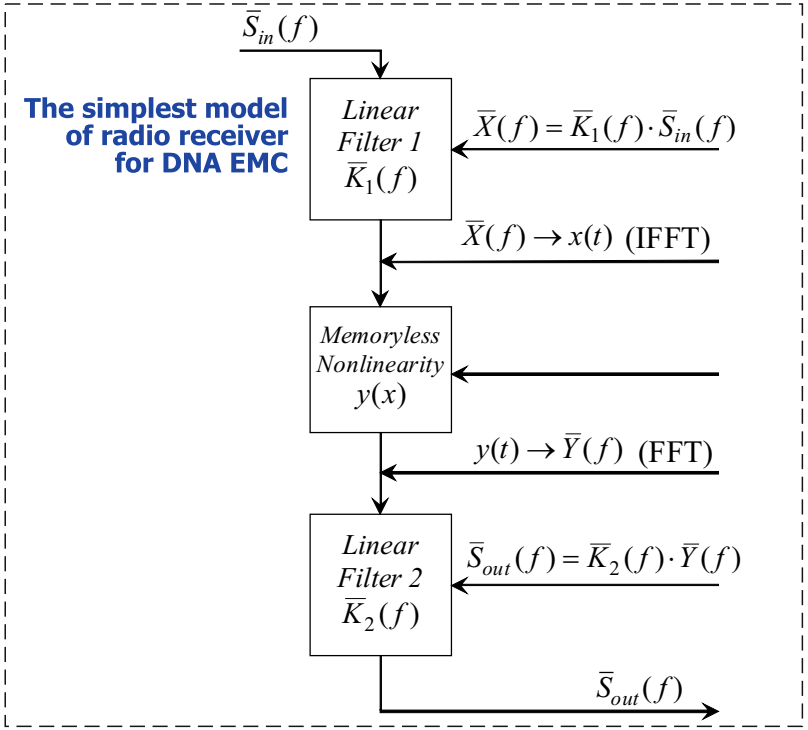
4 Simulation in a wide frequency band (0 – 40 GHz, with possibility of extension) and in a high dynamic range (300 dB)

5 Possibility to use high-order polynomial models of receiver front-end nonlinearity analysis (up to the order 21-25 and higher) for increasing the reliability of EMC

6 Special procedure for identification (search) of sources of nonlinear interference (intermodulation, spurious responses, etc.)

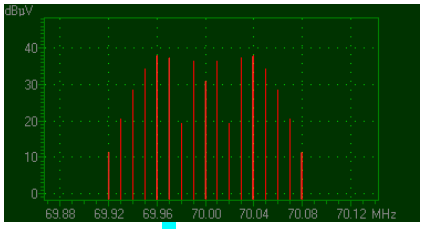
Only DNA EMC is useful for wide-band simulation of receiver operation in an extremely severe EME formed by thousands of modulated signals when it is necessary to consider the combined influence of both linear and nonlinear effects of various types and high orders!

The simplest model of radio receiver for DNA EMC

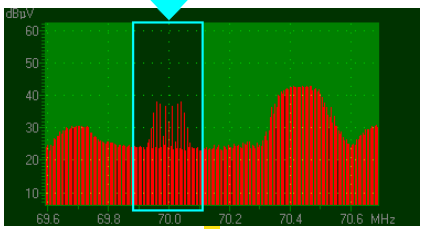


Example of DNA EMC application for EMC analysis: simulation of radio receiver operation in measured electromagnetic environment

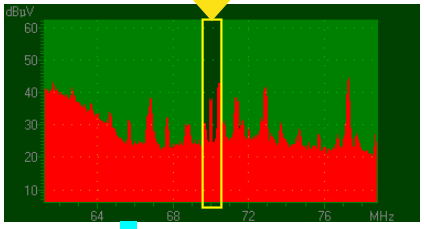
Discrete spectral model of the desired FM signal.
Frequency band: 69,92 – 70,08 MHz



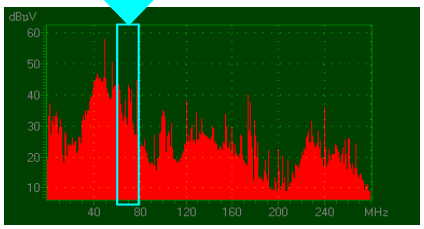
Fragment of total spectrum at the receiver model input: sampled EME (measured by radio monitoring system) is combined with the desired FM signal.
Frequency range: 69,6 – 70,7 MHz



Extended fragment of total spectrum at the receiver model input.
Frequency range: 61,0 – 79,0 MHz



Total spectrum at the receiver model input – this spectrum is used for simulation by DNA EMC.
Frequency range: 1.0 – 280.0 MHz.



Application of our original DNA EMC technology and software in a combination with our original scanning double-frequency test technique of radio receivers EMC testing and our original technique of ensemble statistical modeling & simulation of EME provides the substantial increase of information value, efficiency, objectivity, and accuracy of EMC analysis and design in the most complicated co-site and spatially-distributed complexes of radio systems of various radio services