Measuring and characterizing nonlinear RF systems

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The proposed tutorial deals with the measurement and characterization of nonlinear RF systems. The purpose is to make the attendees aware that measuring the nonlinear behavior of an RF component is completely different from measuring the behavior of a linear device: more evolved measurement techniques are required. Linearizing a nonlinear component is in many applications beneficial but also very involving. This tutorial will give the attendees a guidance of where and how to start measuring and modeling nonlinear RF systems. State-of-the-art measurement and modeling techniques will be presented.

1. Aim of the tutorial

- Gaining insight in the nonlinear behavior of RF components and systems.
- Knowing how to measure the nonlinear behavior of RF systems.
- Selecting the correct power amplifier model.
- Acquiring knowledge of linearization techniques.

2. Tutorial content

A. Linear versus nonlinear systems

- What is the difference between a linear and a nonlinear RF system?
- How to make nonlinearities visible?

B. Measurement instruments for nonlinear RF systems

- Sampler based versus mixer based measurement techniques:
 - a. Overview of state-of-the-art sampling techniques
 - b. Avoiding 'nonlinear' measurement pitfalls
- Overview of commercial 'nonlinear' measurement instruments

C. Modeling techniques for nonlinear RF systems

- General overview of state-of-the-art modeling techniques
- How to model a power amplifier?
- How to linearize a power amplifier?
 - a. Linearization techniques: DPD/PAPR/Feedback