Abstract

This thesis is about high frequency amplifier linearization, focusing on digital predistortion.

In the first chapter I show the challenges of high frequency power amplifier design for state of the art telecommunication networks. The explanation of amplifier design problems associated with non constant envelop signals is given.

In the second chapter I briefly present the most important properties of radio frequency and microwave amplifiers, including quantitative figures of merit in terms of linearity.

In the third chapter I present numerous amplifier linearization strategies, concentrating on digital predistortion. Details concerning the field of application, capabilities (efficiency, linearization performance, bandwidth, complicity) are also given.

In the fourth chapter I show the most important nonlinear models used for power amplifier characterization.

In the fifth chapter mathematical tools are presented for the aforementioned characterization process.

The sixth chapter goes into the details of Inverse and Direct Learning Architecture usage regarding predistorters.

The seventh chapter contains the results of my predistorter simulations. These simulations were done in Matlab.

In the eight chapter I give a detailed description of my baseband digital predistorter using a Zynq SoC and an AD9361 transreceiver RF IC.

The ninth chapter contains the measurement results of the predistorter.

In the tenth chapter progress evaluation and discussion of opportunities regarding the project’s future is given.