

Design and Realization of a Digital Predistorter for a Power Amplifier

Jules Hammenecker
Brussels Faculty of Engineering
Vrije Universiteit Brussel - Université Libre de Bruxelles

2014-2015

Abstract

Contents

1	Introduction	2
1.1	Why Digital Predistortion?	2
1.2	Current Techniques of DPD	2
1.3	ILC	2
1.4	Using ILC for DPD	2
2	Compensating with ILC using the BLA	5
3	Estimating the DPD	6
4	Results	7

Chapter 1

Introduction

1.1 Why Digital Predistortion?

Power amplifiers are used in almost all wireless communication devices. They amplify the communication signal such that a good signal to noise ratio is obtained. They also are an important power consuming block in a communication chain. A power amplifier is often operated in a nonlinear operation mode to improve its efficiency. This nonlinear behavior should be compensated in a later step to reach the strict telecommunication requirements. A Digital Pre-Distortion (DPD) is a common technique to linearize the input-output behavior of a power amplifier. With DPD the input signal of the amplifier is modified such that the desired (i.e. linear) behavior is obtained.

1.2 Current Techniques of DPD

1.3 ILC

1.4 Using ILC for DPD

A nonlinear dynamic system can alternatively be represented by the combination of a linear transfer function G_{BLA} and a nonlinear function F .

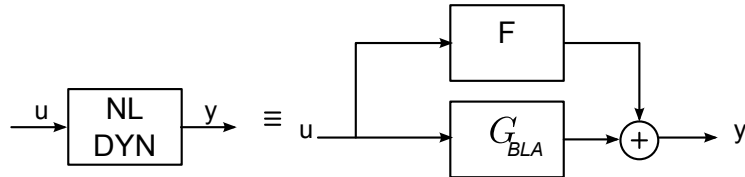


Figure 1.1: Alternative representations of a nonlinear system.

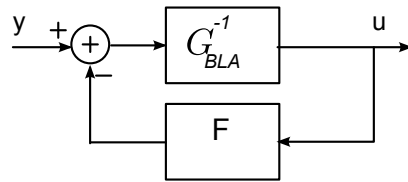


Figure 1.2: Switching the input and output, creating the inverse of the nonlinear system.

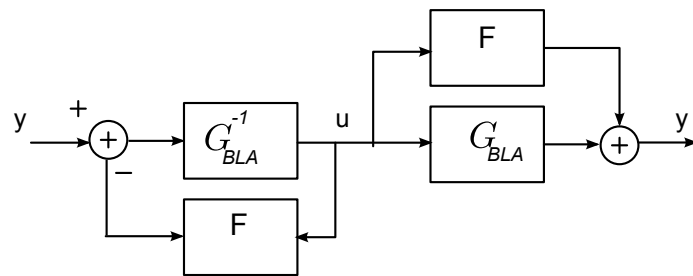


Figure 1.3: Connecting the inverse and the original system together.

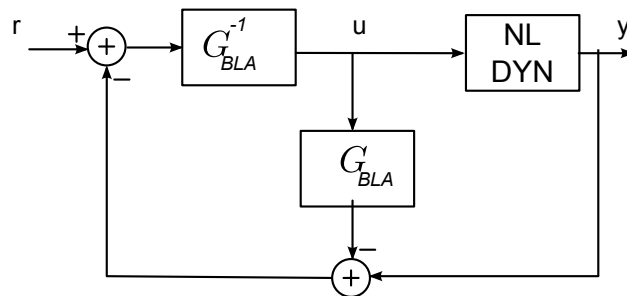


Figure 1.4: Getting creative with the blocks.

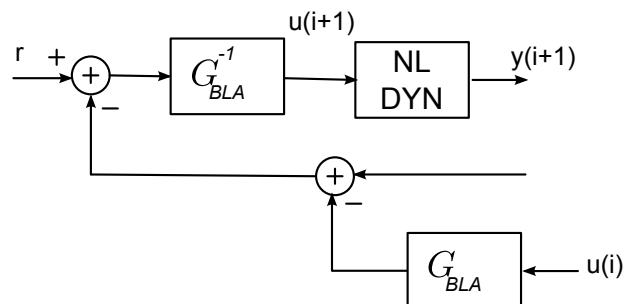


Figure 1.5: Cut the loop!

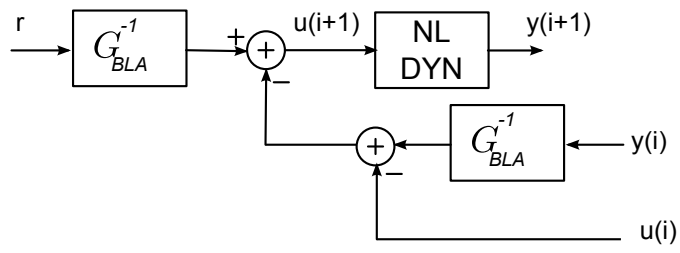


Figure 1.6: Reorganise the blocks one last time.

Chapter 2

Compensating with ILC using the BLA

Chapter 3

Estimating the DPD

Chapter 4

Results

Bibliography

- [1] J. Schoukens, R. Pintelon, Y. Rolain , *Mastering System Identification in 100 Exercises*. IEEE Press (2012), 183-238.