

# Low-complexity, Sub-band DPD with Sequential Learning

## Novel Algorithms and WarpLab Implementation

Chance Tarver · Mahmoud Abdelaziz ·  
Lauri Anttila · Mikko Valkama ·  
Joseph R. Cavallaro

Received: date / Accepted: date

**Abstract** Digital predistortion (DPD) is an effective way of mitigating spurious emission violations without the need of a significant power reduction in the transmitter, thus providing better power efficiency and network coverage. In this paper an iterative version of the IM3 sub-band DPD, proposed earlier by the authors, is presented. The DPD learning is iterated between the higher and lower IM3 sub-bands until a satisfactory performance is achieved for both of them. A sequential DPD learning procedure is also presented in order to reduce the hardware complexity when higher order nonlinearities are incorporated in the DPD learning. Improvements on the convergence speed of the adaptive DPD learning are also achieved via incorporating a variable learning rate and training from previous values. A WARPLab implementation of the proposed DPD is also shown with excellent suppression of the targeted spurious emissions.

**Keywords** Adaptive filters · carrier aggregation · digital predistortion · nonlinear distortion · power amplifier · software-defined radio · spectrally-agile radio · spurious emission.

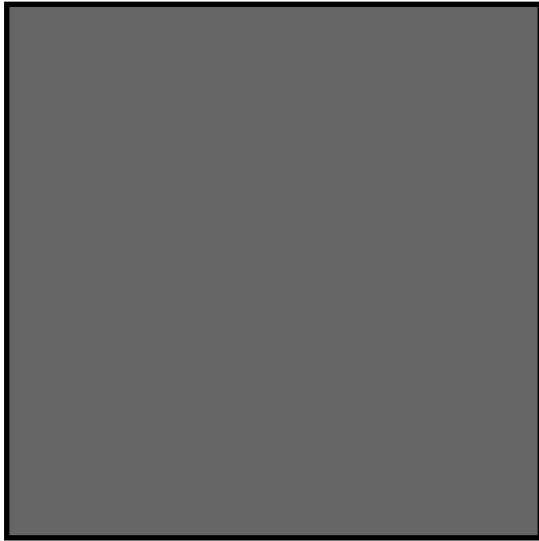
## 1 Introduction

Your text comes here. Separate text sections with

---

Chance Tarver and Joseph R. Cavallaro  
Department of Electrical and Computer Engineering  
Rice University, Houston, TX, 77005, USA  
E-mail: {cat12,cavallar}@rice.edu

Mahmoud Abdelaziz, Lauri Anttila and Mikko Valkama  
Department of Electronics and Communication Engineering  
Tampere University of Technology, Finland



**Fig. 1** Please write your figure caption here

**Table 1** Please write your table caption here

| first  | second | third  |
|--------|--------|--------|
| number | number | number |
| number | number | number |

## 2 Section title

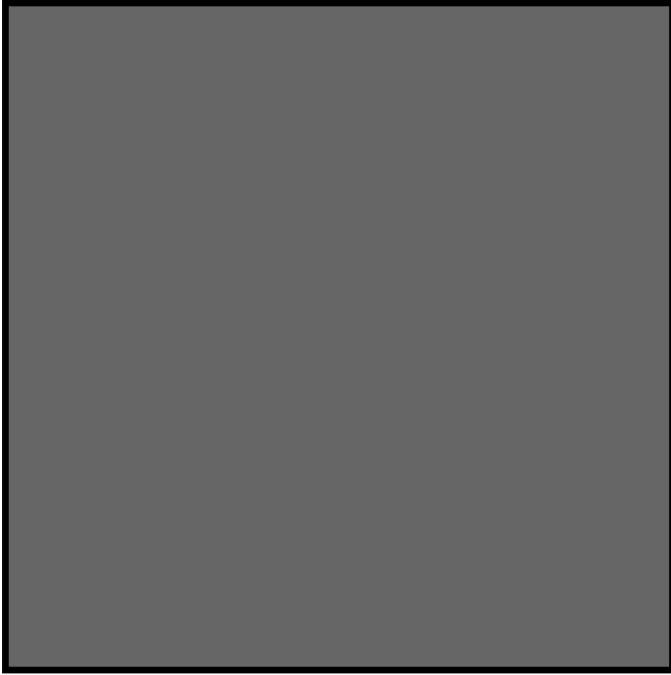
Text with citations [?] and [?].

### 2.1 Subsection title

as required. Don't forget to give each section and subsection a unique label (see Sect. 2).

*Paragraph headings* Use paragraph headings as needed.

$$a^2 + b^2 = c^2 \tag{1}$$



**Fig. 2** Please write your figure caption here