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Data Article

Measured and estimated data of non-linear BRAN channels using HOS in 4G wireless communications

Mohammed Zidane [a,*], Said Safi [b], Mohamed Sabri [a]

[a] Department of Physics, Faculty of Sciences and Techniques, Sultan Moulay Slimane University, Morocco
[b] Department of Mathematics and Informatics, Polydisciplinary Faculty, Sultan Moulay Slimane University, Morocco

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ABSTRACT

The aim of this research is to develop a non-linear blind estimator able to represents a Broadband Radio Access Networks (BRAN) channels. In the one hand, we have used Higher Order Statistics (HOS) theory to build our algorithm. Indeed, we develop a non-linear method based only on fourth order cumulants for identifying the diagonal parameters of quadratic systems. In the other hand, the developed approach is applied to estimate the experimental channels, BRAN A, C and E data normalized for MC-CDMA, in non-linear case. However, the estimated data will be used in the blind equalization. The simulation results in noisy environment and for different signal to noise ratio (SNR) show the accuracy of develop estimator blindly (i.e., without any information about the input) with non-Gaussian signal input. Furthermore, in part of blind equalization problem the obtained results, using Zero forcing (ZF) and Minimum Mean Square Error (MMSE) equalizers, demonstrate that the proposed algorithm is very adequate to correct channel distortion in term the Bit Error Rate (BER). Finally, these estimated data present a necessary asset for conducting validation experiments, and can be also used as a baseline.

* Corresponding author.
E-mail address: zidane.ilco@gmail.com (M. Zidane).

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1. Specifications table

Subject area	Signal processing and digital telecommunications
More Specific subject area	Blind non-linear channels identification, Blind equalization of MC-CDMA systems
Type of data	Tables
How data was acquired	Compensate the fading channel in term the BER in 4G Wireless Communications
Data Format	ETSI BRAN Mobile Channels
Data accessibility	Data is within this article

2. Value of the data

- Exploiting the HOS theory to develop a blind algorithm able to estimate non-linear real channels without reference to the measure;
- The estimated data provides information about the efficiencies of develop method;
- An analysis of the influence of the noise to estimated data of BRAN channels;
- The estimated data can be also used as a baseline;
- Exploiting the estimation data of BRAN channels in blind equalization;
- Can be used for wireless communications in order to compensate the fading channel in term the BER in 4G MC-CDMA systems.

2.1. Data

Three models, BRAN A, C and BRAN E, [1,2] are used in this investigation. These models correspond to typical large open space indoor and outdoor environments with large delay spread. The data presented in Tables 1, 2 and 3 represent the delay and magnitudes of 18 targets of BRAN A, C and E channels respectively.

3. Experimental design, materials and methods

3.1. Non-linear channels representation: A problem formulation

The BRAN channel is modeled as the output of a non-linear quadratic system that is excited by an non-Gaussian signal input and is corrupted at its output by an additive Gaussian noise.

This system can be represented as follows (Fig. 1):

The output of this model is described by the following relationships:

$$y(k) = \sum_{i=0}^{q} h(i,i)x^2(k-i) + w(k) \tag{1}$$

For this system we assume that:

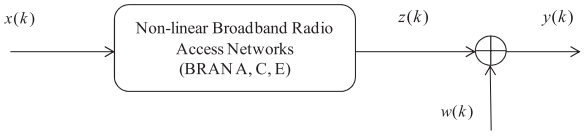

Fig. 1. Non linear quadratic systems.