Cross Validation

Project name: Reception of Non-Linearly Distorted Multi-Carrier Signals (OFDM)

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Summary:

The purpose of this project is to develop an algorithm to deal with the non-linearity in order to achieve the high-power efficiency based on OFDM system. To illustrate their project, the group firstly introduces what is the effect of the non-linearity and the reason why they need to combat it according to the trade-off between power amplifiers (PA) efficiency and linearity. And then they introduce the related architecture explored by former studies: Digital Pre-distortion (DPD) and as well as the limitations of it. Then they propose their methods which uses polynomial series to model the PA and then applies Least-Square Polynomial Fit Estimator to get the corresponding parameters. The whole procedure is illustrated by a flow chart. Finally, they demonstrate their results of the project, showing that with their cancellation algorithm, the BER can be drastically improved in the SNR regime above 20dB. The results also indicate that their nonlinear cancellation tightens the constellation.

Pros:

They demonstrate clearly the limitations of the state-of-the-art method: Digital Pre-distortion (DPD) and the motivation of their project. They simplify the polynomial series in order to model the PA and convince us that only considering the first fundamental tone and the third order harmonic is enough. Further, to illustrate the algorithm, they use a good flow chart to exhibit the details of it. Finally, their simulation shows that with their cancellation algorithm, the BER can be drastically improved in the SNR regime above 20dB and they also shows the result of applying the non-linear cancellation can tighten the constellation, which is effective in the reception of non-linearly distorted signals.

Cons:

First of all, they didn't show where they used the references in their work. And their figure plots are not numbered. Then the method of this project relies on correctly decoded bits to apply the cancellation. If a bit is incorrectly decoded, the result may become worse. Additionally in their simulation part, there is no comparison. It would be better to simulate a relevant algorithm to show the effectiveness of their work.

This project has been verified and evaluated by Bojian Xu and Yukai Sun.