MMSE ESTIMATION OF BASIS EXPANSION MODELS FOR RAPIDLY TIME−VARYING CHANNELS (MonPmPO1)

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Abstract :

In this paper, we propose an estimation technique for rapidly time−varying channels. We approximate the time−varying channel using the basis expansion model (BEM). The BEM coefficients of the channel are needed to design channel equalizers. We rely on pilot symbol assisted modulation (PSAM) to estimate the channel (or the BEM coefficients of the channel). We first derive the optimal minimum mean−square error (MMSE) interpolation based channel estimation technique. We then derive the BEM channel estimation, where only the BEM coefficients are estimated. We consider a BEM with a critically sampled Doppler spectrum, as well as a BEM with an oversampled Doppler spectrum. It has been shown that, while the first suffers from an error floor due to a modeling error, the latter is sensitive to noise. A robust channel estimation can then be obtained by combining the MMSE interpolation based channel estimation and the BEM channel estimation technique. Through computer simulations, it is shown that the resulting algorithm provides a significant gain when an oversampled Doppler spectrum is used (an oversampling rate equal to 2 appears to be sufficient), while only a slight improvement is obtained when the critically sampled Doppler spectrum is used.

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