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Low-complexity channel estimation in massive MIMO wireless communication systems

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The performance of MIMO wireless communication systems is mainly governed by the wireless channel environment. The wireless channel is dynamic and unpredictable, which makes an exact analysis of the wireless communication system often difficult. Linear equations of very high dimensions arising from the pilot-based channel estimators need to be solved for massive Multiple-Input-Multiple-Output (MIMO) communication systems. It is one of the key techniques for future generation wireless communications (e.g. 5G) to improve the power and spectral efficiency. Direct solutions incur very high complexities. Schemes based on polynomial-based inversion of large matrices are designed and analyzed in this paper to lower the complexity by avoiding the direct matrix inversion without performance degradation. The measure of the computational complexity in the channel estimators used in this paper is in terms of the floating-point operations (FLOPs) by which the polynomial-based estimators are shown to lead to a more reduced complexity compared to the conventional estimators used in massive MIMO. The performance evaluation of the designed estimators will consider different interference scenarios where comparison is performed with respect to conventional estimators. The results are analyzed analytically and are simulated in MATLAB then compared with the results achieved in previous research work for validation purposes.

Biography

Yassine El Mouden is a student in the final year of his Bachelor's Degree in Electrical Engineering at the University of Wollongong. His research and academic interests include digital and statistical signal processing, image processing, wireless communication systems, and control systems. His professional memberships include the following but not limited to; Institute of Electrical and Electronics Engineers (IEEE), and Engineers Australia (EA).

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