Efficient Complex Matrix Inversion for MIMO Software Defined Radio

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Abstract

Complex matrix inversion is a very computationally demanding operation in advanced multi-antenna wireless communications. Traditionally, systolic array-based QR decomposition (QRD) is used to invert large matrices. However, the matrices involved in MIMO baseband processing in mobile handsets are generally small which means QRD is not necessarily efficient. In this paper, a new method is proposed using programmable hardware units which not only achieves higher performance but also consumes less silicon area. Furthermore, the hardware can be reused for many other operations such as complex matrix multiplication, filtering, correlation and FFT/IFFT.