

Fast Complex Valued Matrix Inversion for Multi-User STBC-MIMO Decoding

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Abstract:

This paper studies the efficient complex matrix inversion for multi-user STBC-MIMO decoding. A novel method called Alamouti blockwise analytical matrix inversion (ABAMI) and its programmable VLSI implementation are proposed for the inversion of (in this context) large complex matrices with Alamouti sub-blocks. Our solution significantly reduces the number of operations which makes it more than 4 times faster than several other solutions in the literature. Furthermore, compared to these fixed function VLSI implementations, our solution is more flexible and consumes less silicon area because the hardware can be reused for many other operations. In addition to the routine analysis of the general computational complexity based on the number of basic operations, the computational latency is also measured in clock cycles based on the conceptual hardware for real-time matrix inversion.