Application of Matrix Compression in the Method of Moments code EIGER

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The integral equations solved by the Method of Moments (MOM) have become an invaluable tool to analyze and predict the response of systems to electromagnetic environments. Since there is a memory limitation prohibiting the storage of the full matrix for problems large with respect to frequency, alternative techniques have been identified to circumvent this restriction. These alternative techniques are based on methods that use the reduction of the degrees of freedom for the far zone interaction to decrease the storage requirement. Two well-known techniques include the fast multipole method and matrix compression.

In both of these techniques the full matrix is never computed thus alleviating the storage problem. However, matrix compression based on the Adaptive Cross Approximation (Bebendorf, 2000; Zhao et. al, 2005) is a purely algebraic method. Since the full matrix is not stored an iterative approach is used to solve this matrix equation. The solution time and accuracy will depend on the tolerance of the compression algorithm and the tolerance of the iterative solver. Previously this algorithm has been implemented for use on parallel platforms in the method of moments code EIGER.

This talk will focus on problem geometries which have thin slots backed by cavities. Attention will be given to the parallel efficiency of the algorithm as well as the solution accuracy.

A number of results will be described and discussed using the matrix compression algorithm in EIGER. Comparisons will be made with solutions obtained via the direct solve where these solutions are available. Tradeoffs between accuracy and solution time will be presented.

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