A method for the solution of nearly-Hermitian linear systems

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We consider the solution of $n \times n$ linear systems in which the the skew-Hermitian part of the coefficient matrix is of low rank ($s \ll n$). Matrices of this form include discretizations of integral equations derived from wave scattering applications (Lippmann-Schwinger operators) as well as path following methods. Such a linear system can be interpreted as a Schur complement of a larger $(n+s) \times (n+s)$ system, and we can apply the Sherman-Morrison-Woodbury identity to solve this larger system with great savings in storage and computational effort. Most of the effort is spent solving s Hermitian systems. We present numerical results demonstrating the competitiveness of the the new method.