# Spectrally arbitrary, nonderogatory matrix factorization over a general field

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It is known (Sourour[4]) that a nonsingular, nonscalar matrix $A$, over a general field, may be factored as $A = BC$, in which the spectra of $B$ and $C$ are arbitrary, subject only to the obvious determinantal condition $\det A = \det B \det C$. Sourour then uses this result to develop a unified theory for a number of matrix factorization results, provided the underlying field has sufficiently many elements in terms of the order of the matrix being factored. In a recent development, Johnson and Zhang[3] shows that the factorization result of Sourour may be refined in the case of matrices over the complex field, by in addition requiring that the factors $B$ and $C$ be nonderogatory. The purpose of this presentation is to establish the validity of the latter result over a general field with at least four elements, and to use it to remove the requirement on the order of the underlying field in the unified theory of Sourour.

## References

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[4] A. R. Sourour, *A factorization theorem for matrices,* Linear and Multilinear Algebra 19 (1986), 141–147.