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## Spectral inclusion regions for matrix pencils

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### Abstract

Consider the linear pencil  $A - \lambda B$ , where  $A$  and  $B$  are  $n \times n$  complex matrices and  $\lambda \in \mathbf{C}$ . Our main purpose is to obtain spectral inclusion regions for the pencil based on certain fields of values. Namely, we propose efficient methods for the numerical approximation of the field of values of  $A - \lambda B$  denoted by  $W(A, B)$ . Our approach builds on the fact that the field of values can be reduced under compressions to the bidimensional case, in which case these sets can be exactly determined. The obtained results are illustrated by numerical examples. We point out that the given procedure to approximate  $W(A, B)$  compares well with those existing in the literature.

*Key words:* Field of values, Numerical range, Linear pencil, Eigenvalue, Compression.