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ROBUST RATIONAL INTERPOLATION AND LEAST-SQUARES*

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Abstract. An efficient and robust algorithm and a Matlab code `ratdisk` are presented for rational interpolation or linearized least-squares approximation of a function based on its values at points equally spaced on a circle. The use of the singular value decomposition enables the detection and elimination of spurious poles or Froissart doublets that commonly complicate such fits without contributing to the quality of the approximation. As an application, the algorithm leads to a method for the stable computation of certain radial basis function interpolants in the difficult case of smoothness parameter ε close to zero.

Key words. Rational interpolation, spurious poles, Froissart doublets, Padé approximation, radial basis functions, ratdisk, singular value decomposition

AMS subject classifications. 41A20, 41A21, 65D05

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