

# Matrix-valued Polynomial Hermite Interpolation and the Cauchy-Riesz-Dunford Operator Integral in the Finite-dimensional Case

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We compute explicitly the Cauchy-Riesz-Dunford operator integral in the finite-dimensional case by a matrix-valued polynomial Hermite interpolant, where the projections onto the eigenspaces corresponding to different eigenvalues are shown to have the structure of matrix-valued fundamental Hermite basis polynomials. This construction generalizes the well-known explicit formula for the Cauchy-Riesz-Dunford operator integral in the particular case when all eigenvalues have multiplicity equal to 1 and the computation is in terms of a respective matrix-valued Lagrange polynomial interpolant. Several applications of the new formula are considered. We briefly discuss the possibility of extending this construction to compact operators in infinitely dimensional Banach spaces, where the construction needs essential upgrading.

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