STABILITY RESULTS FOR SCATTERED DATA INTERPOLATION ON THE ROTATION GROUP[*]

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Abstract. Fourier analysis on the rotation group $SO(3)$ expands each function into the orthogonal basis of Wigner-D functions. Recently, fast and reliable algorithms for the evaluation of finite expansion of such type, referred to as nonequispaced FFT on $SO(3)$, have become available. Here, we consider the minimal norm interpolation of given data by Wigner-D functions. We prove bounds on the conditioning of this problem which rely solely on the number of Fourier coefficients and the separation distance of the sampling nodes. The reconstruction of N^3 Fourier coefficients from M well separated samples is shown to take only $\mathcal{O}(N^3 \log^2 N + M)$ floating point operations.

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