

QUADRATURE-FREE QUASI-INTERPOLATION ON THE SPHERE*

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Dedicated to Ed Saff on the occasion of his 60th birthday

Abstract. We construct certain quasi-interpolatory operators for approximation of functions on the sphere, using tensor product scattered data satisfying certain symmetry conditions. Our operators are constructed without using any quadrature formulas. We use instead a special class of orthonormal bivariate trigonometric polynomials. These polynomials are functions on the sphere, and are constructed in a numerically stable way, based on the data locations. The quasi-interpolatory operators give near best approximation to every continuous function.

We demonstrate our constructions numerically with several benchmark functions using randomly generated data locations.

Key words. function approximation on the sphere, scattered data, quasi-interpolation, Jacobi matrices

AMS subject classifications. 42A15, 65D32, 33C55

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