Construction of cubature formula for double integration with algebraic singularity by spline polynomial

ABSTRACT

In this note, singular integration problems of the form HŬ(h) = ŭq ŰhŰ(x,y)/|-x0|2-ŬdA, 0 ÒŬ Ò 1, where q = [x0,y0] × [b1, b2], x= (x,y) Ɛ q and fixed point x 0 = (x0,y0) Ɛ q is considered. The density function h(x, y) is assumed given, continuous and smooth on the rectangle q and belong to the class of functions C2,Ŭ(q). Cubature formula for double integrals with algebraic singularity on a rectangle is constructed using the modified spline function Sq(P) of type (0, 2). Highly accurate numerical results for the proposed method is given for both tested density function h(x, y) as linear, quadratic and absolute value functions. The results are in line with the theoretical findings.

Keyword: Cubature formula; Double integration; Algebraic singularity; Spline polynomial