Bicubic Spline Recovering of Smooth Surfaces on the Basis of Irregular Data

N. Naidenov, S. Kostadinova

We consider a method for recovering of a smooth surface $z = f(x, y)$ on the basis of data $\{(x_i, y_i, z_i)\}_{i=1}^{N}$. The method produces a bicubic spline $s(x, y)$ with uniformly distributed knots in a rectangle $R = [a, b] \times [c, d]$, which contains the points $\{X_i(x_i, y_i)\}$. We assume that the points $\{X_i\}$ are placed arbitrarily in the plane and that $z_i = f(X_i) + \epsilon_i,\ i = 1, ..., N$, where the errors $\{\epsilon_i\}$ are independent identically distributed random variables. The main goal of the study is to clarify how the error of the approximation $f(X) \approx s(X)$ depends on the parameters of the problem and the proposed solution.