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Some approximation properties of Szász-Mirakyan type operators

Let C be the set of all real-valued functions f uniformly continuous and bounded on R_0^2 ($R_0 := [0, +\infty)$). The norm on C is defined by

$$\|f\| \equiv \|f(\cdot,\cdot)\| := \sup_{(x,y)\in R_0^2} |f(x,y)|. \tag{1}$$

Moreover, let C^p, $p \in N_0 := \{0, 1, 2, \ldots\}$, be the set of all $f \in C$ with all partial derivatives $\frac{\partial^k f}{\partial x^{k-i}\partial y^i}$, $0 \le i \le k \le p$, belonging also to C with the norm (1) ($C^0 \equiv C$).

Approximation of continuous functions of two variables by Szász-Mirakyan operators defined by

$$S_{m,n}(f;x,y) := e^{-mx-ny} \sum_{j=0}^{\infty}\sum_{k=0}^{\infty} \frac{(mx)^j}{j!}\frac{(ny)^k}{k!} f\left(\frac{j}{m}, \frac{k}{n}\right), \ f \in C, \tag{2}$$

$(x,y) \in R_0^2$, $m, n \in N := \{1, 2, \ldots\}$, has been investigated by several authors.

In this note we introduce certain linear operators of Szász-Mirakyan type in C^p, $p \in N_0$, and we study approximation properties of these operators.

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