# New properties of certain Markov type approximation processes

**Octavian Agratini**

Department of Mathematics
Babeş-Bolyai University
Cluj-Napoca, Romania

agratini@math.ubbcluj.ro

Our presentation focuses on linear positive operators that reproduce the constants. Practically we consider two classes of discrete operators.

Firstly we investigate the operators acting on the space of continuous functions on $[0,\infty)$ having polynomial growth and defined as follows

$$(P_n^{[\beta]}f)(x)=\sum_{k=0}^{\infty}w_\beta(k,nx)f\left(\frac{k}{n}\right),\ x>0,\ n\in\mathbb{N},$$

where

$$w_\beta(k;\alpha)=\frac{\alpha}{k!}(\alpha+k\beta)^{k-1}e^{-(\alpha+k\beta)},\ \alpha>0,\ \beta\in[0,1),\ k\in\mathbb{N},$$

is a Poisson-type distribution. The sequence $(P_n^{[\beta]})_{n\geq 1}$ has been introduced by Jain [2]. We aim to collect the most significant outcomes obtained relative to these operators. Latest results refer to obtaining an asymptotic formula, to the study both of uniform convergence and of statistical convergence.

Secondly we spotlight Bernstein type operators known as Balázs-Szabados operators [1] designed by the following relation

$$(R_nf)(x)=\frac{1}{(1+a_nx)^n}\sum_{k=0}^{n}\binom{n}{k}(a_nx)^kf\left(\frac{k}{b_n}\right),\ x\geq 0,\ n\in\mathbb{N},$$

where $f:\mathbb{R}_+\to\mathbb{R}$, $a_n$ and $b_n$ are positive real numbers independent of $x$ suitable chosen. We prove that these operators possess the variation detracting property and $(R_nf)_{n\geq 1}$ converges in variation to $f\in BV(I)$.

Also we present an integral extension in Kantorovich sense of $R_n$ operators and, further on, we investigate their approximating properties in the framework of polynomials weighted functions spaces.

Only the papers which served as starting points in our study are listed in References.

## References

[1] Balázs, C., Szabados, J., *Approximation by Bernstein type rational functions*, Acta Math. Acad. Sci. Hungar., **26**(1975), f. 1-2, 123-134.

[2] Jain, G.C., *Approximation of functions by a new class of linear operators*, Journal of the Australian Math. Society, **13**(1972), 271-276.