Weighted φ-transformed systems

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Given a system $(u_0, \ldots, u_n)$ of functions defined on $I = [a, b]$, $\varphi : [a, b] \to \mathbf{R}$ a positive function and $d_0, \ldots, d_n$ positive real values, the corresponding *weighted φ-transformed* system from $(u_0, \ldots, u_n)$ is the system $(\tilde{u}_0, \ldots, \tilde{u}_n)$ defined by

$$\tilde{u}_i(t) := d_i \varphi(t) u_i(t), \quad t \in [a, b], \quad i = 0, \ldots, n. \tag{1}$$

In this paper we show that a weighted φ-transformed system inherits the properties of being TP and being a B-basis of the initial system $(u_0, \ldots, u_n)$. This result allows us to deduce shape preserving properties of general rational functions which cover the family of bases introduced in [3], and so the case of denominators of the form $\prod_{i=1}^{n}(1 - t + q^{i-1}t)$ where q is a positive constant (cf. [1] and [2]).

Joint work with: E. Mainar, J. M. Peña.

References

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