

# A New Class of Curves of Rational B-Spline Type

Mohamed ALLAOUI<sup>1</sup>, Jamal ADETOLA<sup>2</sup>, Wilfrid HOUEDANOU<sup>3</sup>, and Aurélien GOUDJO<sup>4</sup>

<sup>1</sup>Département de Sciences économiques, Université de Comores, Comores

<sup>2</sup>Université Nationale des Sciences, Technologie, Ingénierie et Mathématiques (UNSTIM), Bénin

<sup>3</sup>Université d'Abomey-Calavi

<sup>4</sup>Université d'Abomey-Calavi

September 25, 2021

## Abstract

A new class of rational parametrization has been developed and it was used to generate a new family of rational  $k$  functions B-splines which depends on an index  $\alpha \in [0, 1]$ ,  $0 \leq \alpha \leq 1$ ,  $\alpha \in [0, 1]$ . This family of functions verifies, among other things, the properties of positivity, of partition of the unit and, for a given degree  $k$ , constitutes a true basis approximation of continuous functions. We loose, however, the regularity classical optimal linked to the multiplicity of nodes, which we recover in the asymptotic case, when  $\alpha \rightarrow 0$ . The associated B-splines curves verify the traditional properties particularly that of a convex hull and we see a certain “conjugated symmetry” related to  $\alpha$ . The case of open knot vectors without an inner node leads to a new family of rational Bezier curves that will be separately, object of in-depth analysis.

## Hosted file

AJHG.pdf available at <https://authorea.com/users/436444/articles/538751-a-new-class-of-curves-of-rational-b-spline-type>