

## MONOTONICITY AND CONVEXITY PRESERVING RATIONAL SPLINE HISTOPOLATION

MALLE FISCHER<sup>1</sup> and PEETER OJA<sup>2</sup>

*Institute of Applied Mathematics, University of Tartu*

Liivi 2, 50409, Tartu, Estonia

E-mail: {<sup>1</sup>malle.fischer, <sup>2</sup>peeter.oja}@ut.ee

For given monotone data we propose the construction of a histopolating linear/linear rational spline of class  $C^1$  using minimal quantity of knots. The uniqueness and existence of this spline is proved. The method is implemented via the representation with histogram heights and first derivatives of the spline. The rate of convergence is  $O(h^3)$ . In actual construction of the histopolant, the use of Newton's method and ordinary iterations are discussed.

For given convex data the construction of a histopolating quadratic/linear rational spline of class  $C^2$  is considered. Standard technics allows to prove the uniqueness of this histopolant. The noncoincidence of given grid points and spline knots gives an excessive freedom which does not guarantee the existence of the histopolant. At the same time, an appropriate choice of spline knots for the existence is possible.