



An inverse of the running average operator for algebraic polynomials and its applications to shape preserving spline interpolation

Vesselin Vatchev

Abstract

A method for constructing shape preserving spline interpolants of higher order is considered. The method uses the inverse of the running average operator for algebraic polynomials of degree n . The method is constructive and can supplement and extend to Hermite type interpolation the existing algorithms for shape preserving spline interpolation. Different cases for n less than 4 are considered in details.

Keywords: shape preserving spline interpolation, inverse operators, running average operator.

MSC: Primary 41A29; Secondary 65D10.

§1. Introduction

The running, or moving, average operator, with a window size $\alpha > 0$, is well known and frequently used in practice. For locally integrable functions, f , it is defined as

$$K_\alpha f(x) = \frac{1}{2\alpha} \int_{x-\alpha}^{x+\alpha} f(t) dt = \frac{1}{2\alpha} \int_{-\alpha}^{\alpha} f(x+t) dt = \frac{1}{2\alpha} f * \chi_{[-\alpha, \alpha]}(x), \quad (1.1)$$

Communicated by
D. Leviatan

Received
September 26, 2011
Accepted
April 1, 2012