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A simple proof of the Gasca-Maeztu conjecture for $n = 4$

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Abstract

In this paper we consider n -poised node sets whose all n -fundamental polynomials are products of n linear factors, as it always takes place in the univariate case. Gasca and Maeztu conjectured [6] that every such set possesses a maximal line, i.e., a line passing through its $n + 1$ nodes. Till now the conjecture is confirmed to be true for $n \leq 5$. The case $n = 4$ was proved for the first time by Busch [2]. The case $n = 5$ was proved recently by Hakopian, Jetter and Zimmermann [9]. In this paper we bring a simple and short proof of the conjecture for $n = 4$. In the proof we use some new ideas and methods of the above mentioned proof for the case $n = 5$.

Keywords: polynomial interpolation, Gasca-Maeztu conjecture, fundamental polynomial, maximal line, n -poised, n -independent nodes.

MSC: Primary 41A05; Secondary 41A63, 14H50.

§1. Introduction

There are three proofs of the Gasca and Maeztu conjecture for the case $n = 4$. For the first time it was proved by Busch in 1990 [2]. Then, two other proofs have appeared for the case $n = 4$, by Carnicer and Gasca [4] and by Hakopian, Jetter, and Zimmermann [8]. Recently the conjecture was proved in the case $n = 5$ by the latter three authors [9]. In

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