


Cell reducing and the dimension of the C^1 bivariate spline space

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Abstract

In this paper, the problem of determining the dimension of the space $S_n^1(\Delta)$, $n \geq 3$ of bivariate C^1 splines of degree $\leq n$ over a triangulation Δ is considered. The piecewise polynomials are represented as blossoms, and the smoothness conditions are written as a system of linear equations. The rank of the system matrix is analysed by repeatedly reducing small subtriangulations (cells) at the boundary of a triangulation. It is shown that the dimension of the bivariate spline space $S_n^1(\Delta)$, $n \geq 3$ is equal to Schumaker's lower bound for a large class of triangulations.

Keywords: Dimension, spline space, triangulation, cell.

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Celična redukcija in dimenzija C^1 bivariatnega prostora zlepkov

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Povzetek

V tem članku obravnavamo problem določitve dimenzije prostora $S_n^1(\Delta)$, $n \geq 3$ bivariatnih C^1 zlepkov stopnje $\leq n$ nad triangulacijo Δ . Funkcije, ki so odsekoma polinomi, predstavimo s šopki, pogoje gladkosti pa zapišemo kot sistem linearnih enačb. Rang sistemske matrike analiziramo s pomočjo ponavljajočih se reducirajočih majhnih podtriangulacij (celic) na robu triangulacije. Pokažemo, da je za velik razred triangulacij dimenzija bivariatnega prostora zlepkov $S_n^1(\Delta)$, $n \geq 3$ enaka Schumakerjevi spodnji meji.

Ključne besede: Dimenzija, prostor zlepkov, triangulacija, celica.

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