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Construction and approximation of surfaces by smoothing meshless methods.

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Abstract

In Earth science, especially Geology and other Sciences and Technologies, the reconstruction of surfaces from some scattered data set is a commonly encountered problem.

In this work, under a generic schema, we enrich the theory of the discrete variational spline functions by minimizing some quadratic functional in a suitable space which can be a fairness functional, the flexion energy of a thin plate or others.

It is essential to consider a finite dimension space of functions, where the minimization problem can be solved, and then a variational problem will be formulated. The discrete finite dimension space of functions that we propose, in this case, is a parametric finite dimensional space generated by a radial function basis. Then, we describe a smoothing meshless method of surfaces. The convergence of the problem is shown and finally, we analyze some numerical and graphical examples.

Key words: Surfaces, approximation, smoothing, meshless methood.