UAEU كلية العلوم College of Science
جامعة الإمارات العربية المتحدة United Arab Emirates University
Department of Mathematical Sciences
قسم علـوم الرياضيـــــات

Department of Mathematical Science Cordially Invites You to Attend the Seminar on

Scattered Data Interpolation in $\mathbb{R}^3$ using Minimum Norm Curve Networks

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Sofia University "St. Kliment Ohridski"

Thursday, 18 November, 2021
11:00-11:50 AM

Online: https://eu.bbcollab.com/guest/493e136ad3f642a89e21333c291b92a1

Abstract:

Scattered data interpolation is a fundamental problem in approximation theory and Computer Aided Geometric Design with applications in a variety of fields such as automotive, aircraft and ship design, architecture, medicine, computer graphics, and more. Recently, the problem has become particularly relevant in bioinformatics and scientific visualization for surface reconstruction from point clouds.

We study two extremal problems (unconstrained and constrained) related to interpolation of scattered data in $\mathbb{R}^3$ by smooth curve networks with minimal L_p-norm of the second derivative for $1 < p < \infty$. The unconstrained problem for $p = 2$ was set and solved by Nielson [1]. Andersson et al. [2] gave a new proof of Nielson's result by using a different approach. It allowed them to set and solve the constrained extremal problem of interpolation of convex scattered data in $\mathbb{R}^3$ by minimum L_2-norm networks that are convex along the edges of an associated triangulation. The unconstrained problem for $1 < p < \infty$ was solved in [3].

In this talk we will present a complete characterization of the solutions to both the unconstrained and the constrained problems for $1 < p < \infty$.

References

[1] G. M. Nielson. A method for interpolating scattered data based upon a minimum norm network. *Math. Comput.*, 40(161):253–271, 1983.

[2] L.-E. Andersson, T. Elfving, G. Iliev, K. Vlachkova. Interpolation of convex scattered data in $\mathbb{R}^3$ based upon an edge convex minimum norm network. *J. of Approx. Theory*, 80(3):299–320, 1995.

[3] K. Vlachkova, Interpolation of scattered data in $\mathbb{R}^3$ using minimum L_p-norm networks, $1 < p < \infty$, *J. Math. Anal. Appl.*, 485(2), 123824 (2020).