AORC Monthly Seminar

Jan. 29 (Fri), 2021 @ AORC (Online)

Group 2 :

Controlling extremal Pythagorean hodograph curves by Gauss–Legendre polygons

- Speaker : Soo Hyun Kim (AORC Group 2)

- Abstract : The construction problem of spatial Pythagorean hodograph (PH) curves with a given Gauss–Legendre polygon is addressed. For planar/spatial PH curves of degree $2n + 1$, the Gauss-Legendre polygon, which consists of the edges obtained by evaluating the hodograph at the nodes of the Gauss–Legendre quadrature, with $n + 1$ edges is the rectifying polygon, which has the same length as the PH curve. On the other hand, if a planar polygon with $n + 1$ edges is given, there are 2^n planar PH curves whose Gauss–Legendre polygon is the given polygon. We here generalize this result to the spatial PH curves. For a given spatial polygon with $n + 1$ edges, we construct n parameter family of PH curves of degree $2n + 1$. Among those PH curves, we identify 2^n extremal solutions by choosing the quaternion preimages of the hodograph to have the maximal or the minimal distances from the adjacent quaternion solutions. We show that the extremal PH curves are the natural generalization of 2^n planar PH curves with the planar Gauss–Legendre polygon by proving the planarity condition: the extremal PH curves are planar if the provided polygon is planar. This is a joint work with Hwan Pyo Moon and Song-Hwa Kwon.

Group 3 :

ADMM as Continuous Dynamical Systems

- Speaker : Bomi Shin (AORC Group 3)

- Abstract : There has been as increasing interest in using tools from dynamical systems to analyze the behavior of simple optimization algorithms such as gradient descent and its variants. In this talk, we study some introductory connections by deriving the differential equations that model the continuous limit of the sequence of iterates generated by the alternating direction method of multipliers (abbrev. ADMM). We introduce some stability properties of the resulting dynamical systems and propose one problem which is ongoing work with this direction.

[1] Guilherme Franca, Daniel Robinson, Rene Vidal, ADMM and Accelerated ADMM as Continuous Dynamical Systems. International Conference on Machine Learning. 2018. p. 1559–1567.

SRC Funded by NRF of Korea

AORC 응용대수 및 최적화 연구센터
Applied Algebra & Optimization Research Center

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- Object : Active collaboration within and between groups, fitting the aim of SRC

- Plan : Newly-joined researchers take pivotal roles.

- Operations Committee :
  - Nhan Phu Chung (Committee Chair, Principal professor)
  - Bumtle Kang (Group 1), Juyoung Jeong (Group 2), Boran Kim (Group 3)

Program

- 2:00 - 2:50 pm : Byung-Hak Hwang(AORC Group 1) & discussion

- 3:00 - 3:50 pm : Soo Hyun Kim (AORC Group 2) & discussion

- 4:00 - 4:50 pm : Bomi Shin (AORC Group 3) & discussion

Abstracts

Group 1 :

Ribbon tiling and character formula for periplectic Lie superalgebras

- Speaker : Byung-Hak Hwang (AORC Group 1)
- Abstract : In 1977, Kac classfied simple Lie superalgebras and initiated the study of representations of the Lie superalgebras. After his works, the problem of computing the character of the finite-dimensional irreducible modules over Lie superalgebras have emerged as an important issue in this field. The periplectic Lie super algebra is one of the simple Lie superalgebras. Because of their strange behaviors, the character problem for this algebra had not been revealed for a long time. Very recently, Serganova et al. discovered a relationship between the irreducible modules and Kac modules. In this talk, I will briefly review the highest weight theory of Lie algebras and Lie superalgebras, and present a character formula for the finite-dimensional irreducible module over the periplectic Lie superalgebras in terms of ribbon tilings.