G^1 Hermite interpolation method for spatial PH curves over planar PH curves

Yoonae Song
Department of Mathematics, Dongguk University-Seoul, Korea
syoonae@dongguk.edu

A special type of spatial Pythagorean hodograph (PH) curves, whose planar projection also has the PH property, were introduced recently in [1]. In this work, we present a G^1 Hermite interpolation method for this type of curves. While the projection plane is fixed as the xy plane, these curves can be regarded as spatial PH curves over planar PH curves, which we call PH over PH (PHoPH) curves. Because of the additional constraint, PHoPH curves should have more complicated algebraic structure than usual spatial PH curves. We investigate this structure using the quaternion algebra to obtain a compact representation of PHoPH from quaternion generator polynomials. Based on this representation, we address the G^1 Hermite interpolation problem using quintic PHoPH curves. The problem is formulated as a system of nonlinear equations involving trigonometric functions, which can be solved by numerical methods. We analyze the feasibility of this problem and present some computed examples.

Joint work with: Soo Hyun Kim, Hwan Pyo Moon.

References

[1] Farouki, Rida T and Knez, Marjeta and Vitrih, Vito and Žagar, Emil. Planar projections of spatial Pythagorean-hodograph curves. *Computer Aided Geometric Design*, 91:102049, 2021.