

四元数体上微分方程的基本框架

Speaker: Yonghui Xia
Zhejiang Normal University

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Abstract: This talk is to give a frame work for the theory of linear QDEs, which can be applied to quantum mechanics, fluid mechanics, Frenet frame in differential geometry, kinematic modeling, attitude dynamics, Kalman filter design, spatial rigid body dynamics, etc. We prove that the set of all the solutions to the linear homogenous QDEs is actually a right-free module, not a linear vector space. On the noncommutativity of the quaternion algebra, many concepts and properties for the ODEs cannot be used. They should be redefined accordingly. A definition of Wronskian is introduced under the framework of quaternions which is different from standard one in the ODEs. Liouville formula for QDEs is given. Also, it is necessary to treat the eigenvalue problems with left and right sides, accordingly. Upon these, we studied the solutions to the linear QDEs. Furthermore, we present two algorithms to evaluate the fundamental matrix. Some concrete examples are given to show the feasibility of the obtained algorithms. Finally, a conclusion and discussion end the paper.