### *High-order linearly implicit schemes conserving quadratic invariants*
**Shun Sato**
**(The University of Tokyo)**
Yuto Miyatake, John C. Butcher

In this talk, we propose linearly implicit and arbitrary high-order conservative numerical schemes for ordinary differential equations with a quadratic invariant. Many differential equations have invariants, and numerical schemes for preserving them have been extensively studied. Since linear invariants can be easily conserved after discretisation, quadratic invariants are essentially the simplest. Quadratic invariants are important objects that appear not only in many physical examples but also in the computationally efficient conservative schemes for general invariants such as scalar auxiliary variable approach, which have been studied in recent years. It is known that quadratic invariants can be kept relatively easily compared to general invariants, and indeed can be preserved by canonical Runge–Kutta methods. However, there is no unified method for constructing linearly implicit and high order conservative schemes. In this talk, we construct such schemes based on canonical Runge–Kutta methods and prove some properties involving accuracy.