# Variational Integrators and Discrete Lagrangian Systems for Interconnected Systems

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For the sake of modeling complicated physical systems such as very large scale electric circuits and nonholonomic systems, it is essential to understand the existing structural relations of how the energy interactions between subsystems and elements are regulated. Such a machinery of regulating power flow has been called an "interconnection", first coined by Kron. It is known that such an interconnection can be geometrically represented by a Dirac structure, which is a unified notion of pre-symplectic and Poisson structures. In particular, it was shown by Yoshimura and Marsden(2016) that such an interconnected system can be represented by Lagrange-Dirac dynamical systems in the context of induced Dirac structures. In this talk, we show the variational structure of such an interconnected system with holonomic constraints and with the interconnection of distinct Lagrange-Dirac systems. Then, we show that a discrete variational integrator can be developed for the interconnected system and also that there exists two kinds of variational integrators. We also illustrate the validity of our theory by some numerical tests.