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Discrete variational methods show excellent performance in numerical simulations of different mechanical systems. In this talk, we present an iterative procedure for the solution of discrete variational equations for boundary value problems. More concretely, we explore a parallelization strategy that leverages the capabilities of multicore CPUs and GPUs (graphics cards).

We study this parallel method for higher-order Lagrangian systems, which appear in fully-actuated problems and beyond. The study of the convergence conditions of these methods poses interesting challenges that have led us to the study of, among other things, the discrete Jacobi equation.

Joint work with Sebastián J. Ferraro (Universidad Nacional del Sur & CONICET) and David Martín de Diego (Instituto de Ciencias Matemáticas - CSIC-UAM-UC3M-UCM).