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Conservative discretization and long term stability

We review a recent method, called the multiplier method, on discretizing ODEs and PDEs so that their conservation laws are exactly preserved at the discrete level. In contrast to geometric numerical integrators, such as symplectic and variational integrators, the multiplier method is applicable for systems even without a symplectic or variational structure, such as dissipative problems. Moreover, we discuss the long term stability and preservation of topological properties of the multiplier method for ODEs.

Reference:

Andy T.S. Wan, Alexander Bihlo, and Jean-Christophe Nave, "The Multiplier Method to Construct Conservative Finite Difference Schemes for Ordinary and Partial Differential Equations", SIAM J. Numer. Anal., 54(1), 86–119, 2016