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*Dirac structures and dynamical systems in nonequilibrium thermodynamics.*

We show that the evolution equations for nonequilibrium thermodynamics admit intrinsic formulations in terms of Dirac structures as well as variational structures, both on the Lagrangian and the Hamiltonian settings. We construct several Dirac structures over a thermodynamic configuration manifold and we show how the Dirac structures include nonlinear nonholonomic constraints originated from the entropy production in each irreversible process. Associated to the Dirac structures, there exists the Lagrange-d'Alembert-Pontryagin formulation for Lagrangian nonequilibrium thermodynamics, which is a natural extension of Hamilton-Pontryagin variational principle in mechanics. We also demonstrate how the Hamiltonian formulation can be carried out in the context of the Hamilton-d'Alembert-Pontryagin principle associated to the Dirac structures. This is a joint work with Francois Gay-Balmaz. (Received January 28, 2019)