Abstract Submitted
for the APR20 Meeting of
The American Physical Society

Energy Transformations in a Class of Common Physics Problems
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We examine a category of physics problems commonly encountered in introductory physics classes, in which a system comprised of two subsystems dissipates electrical or mechanical energy through interaction of these subsystems. One example of such a system would be a perfectly inelastic collision between two objects in one dimension. In this case, given the initial state of the system before collision, conservation of linear momentum uniquely determines the amount of kinetic energy dissipated in the collision, regardless of the dissipation mechanism. We analyze a class of disparate systems that are similarly constrained by a constant of interaction and that share a mathematical formalism. In each case, the constant of interaction determines the mechanical or electrical energy of the final state, regardless of dissipation mechanism. Such examples can be useful in teaching students about energy transformations in a variety of systems.

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Date submitted: 09 Jan 2020 Electronic form version 1.4