Time-dependent Lagrangian systems on Lie groups

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We study time-dependent Lagrangian systems on Lie groups and derive their equations of motion using a variational framework. This formulation provides a structured approach to analyzing non-conservative mechanical systems where time-dependent effects play a crucial role. As a representative example, we examine the dynamics of a rigid body with a fixed pivot point evolving on the Lie group SO(3). The system is free to rotate in three dimensions while subject to a linear dissipation term, illustrating the application of our theoretical framework to practical mechanical models.

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