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**On Matched Pair Hamiltonian Analysis of the Compartmental Models**

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**Abstract**

Epidemiological compartmental models predict the spread of an infectious disease that a specific population encounter. The population is divided into compartments representing different stages of the epidemic and the change of these compartments in time is given by nonlinear differential equations. In previous studies, the Hamiltonian analysis of these models is included. In this work, we briefly explain SIR, SEIR, 2-SIR and 2-SEIR models, and their Hamiltonian analysis. We recollect the matched pair Lie-Poisson systems and observe that SIR and SEIR models can be written as matched pair Lie-Poisson systems. We generalize the matched pair Lie-Poisson systems using the twisted cocycle extension. We attain that matched pair Lie-Poisson systems obtained by the twisted cocycle extension is convenient for 2-SIR and 2-SEIR models.

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