

# Discrete mechanics on interval algebra

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## **Abstract**

Baezs and Gilliams approach to discrete mechanics deals with discrete mechanical systems, such as cellular automata, in which time proceeds in integer steps and the configuration space is discrete. In order to allow for imprecision in the input data, their approach is extended to discrete mechanical systems that take values in a set of extended intervals. This is accomplished by introducing the Dual operator of generalized interval arithmetic. Because distributivity is only a conditional property, imprecision may lead to time evolution maps that do not satisfy the equations of motion: in these cases, only guaranteed bounds on the flow can be calculated. When the time evolution map satisfies the equation of motion, a version of the Noethers theorem can be proven, and conserved quantities Poisson commute.