

Variable step size implementation of a generalized- α Lie group integrator

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Step size selection is an efficient method to improve the result accuracy and to keep the costs low.

In this presentation, such a step size control shall be developed for the generalized- α method in its Lie group formulation, which is a second order time integration method for differential-algebraic equations. However, an order reduction may appear when the step size is varied. An adaption of velocity and acceleration variables must be carried out to prevent this. Afterwards, local truncation errors can be estimated with which the time step control is carried out. The error estimates are investigated for differential-algebraic equations in index-3 and in stabilized index-2 formulation. The variable step size implementation is tested for the Heavy top benchmark in the Lie groups $\mathbb{R}^3 \times SO(3)$ and $SE(3)$.