

The Discrete Moser-Veselov algorithm for the free Rigid Body, revisited

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We revisit the Moser-Veselov description of the free Rigid Body in body coordinates, which, in the 3×3 case, can be implemented as an explicit, second order, integrable approximation of the continuous solution. By backward error analysis, we study the modified vector field which is integrated exactly by the discrete algorithm. We deduce that the discrete Moser-Veselov (DMV) is well approximated to higher order by time-reparametrizations of the continuous equations (modified vector field). We use the modified vector field to scale the initial data of the DMV to improve the order of the approximation and show the equivalence of the DMV and the RATTLE algorithm. Numerical integration with these preprocessed initial data is several orders of magnitude more accurate of the original DMV and RATTLE approach.

This talk is based on a joint work with Robert MacLachlan