Power Series Solution to Sliding Velocity in Three-Dimensional Multibody Systems with Impact and Friction

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Abstract : The system of ordinary nonlinear differential equations describing sliding velocity during impact with friction for a three-dimensional rigid-multibody system is developed. No analytical solutions have been obtained before for this highly nonlinear system. Hence, a power series solution is proposed. Since the validity of this solution is limited to its convergence zone, a suitable time step is chosen and at the end of it a new series solution is constructed. For a case study, the trajectory of the sliding velocity using the proposed method is built using 6 time steps, which coincides with a Runge-Kutta solution using 38 time steps.