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Application of Volterra series to simulate dynamics of a Reissner beam

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Sound synthesis of strings needs the use of nonlinear models to provide realistic sounds according to the amplitude and the method of excitation (pluck, bow...). In order to include coupling between the differents degrees of freedom, the Reissner beam model will be used to simulate nonlinear dynamics of a string.
Expression of equilibrium of Reissner beams using Lie groups and algebras allows to write an exact, simple formulation including nonlinearities due to large strains. This work aims to apply Volterra series method to this formulation in order to perform simulation of a Reissner beam at a given order of nonlinearity.
Volterra series requires a rewriting of the model with well-defined boundary and initial conditions and interconnection laws of the series adapted to the variables (vector and matrix). Once the linear part isolated and studied (calculation of the Green function, and therefore of the first kernel), nonlinear terms must be organized to define a recurent relation and solve the kernel equation. Finally, it can be possible to identify a structure of simulation using instantaneous sums and products of outputs of linear filters.