

Kinematically accurate separation of the large rotation into axial and transverse in problems of rotor dynamics

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In order to overcome the problem of "singular points", a method has been developed for the kinematically accurate separation of a large rotation into an axial (scalar) and a transverse (Euler vector). The proposal is based on the fact that in the problems of the rotor dynamics of machines consisting of shafts, gears, bearings, etc., the transverse rotation never reaches a value of 2π (a critical value for the Euler vector). The axial rotation is not limited in any way. Differential equations of the dynamics of rotational motion are also divided into axial (scalar) and transverse (vector). The above example shows that the constructed system of differential equations can be easily integrated by standard numerical methods to very large total rotations without any restrictions, provided that the transverse rotation is limited to 2π . The control of the results is checked by observing the law of conservation of total energy.

Keywords: large rotations, Euler vector, rotation tensor, Zhilin tensor, composition of rotations, rotor dynamics

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