Extension of the Method of Direct Separation of Motions for Problems of Oscillating Action on Dynamical Systems - DTU Orbit (09/11/2017)

Extension of the Method of Direct Separation of Motions for Problems of Oscillating Action on Dynamical Systems

A general approach to study oscillating action on nonlinear dynamical systems is developed. It implies a transition from initial governing equations of motion to much more simple equations describing only the main slow component of motions (the vibro-transformed dynamics equations). The approach is named as the Oscillatory Strobodynamics, since motions are perceived as under a stroboscopic light. The vibro-transformed dynamics equations comprise terms that represent the averaged effect of the oscillating action. The method of direct separation of motions (MDSM) appears to be an efficient and simple tool to derive these equations. A modification of the method applicable to study problems that do not imply restrictions on the spectrum of excitation frequencies is proposed. It allows also to abandon other restrictions usually introduced when employing the classical asymptotic methods, e.g. the requirement for the involved nonlinearities to be weak.Several relevant examples from Mechanics, Physics, Chemistry, and Biophysics are considered by means of the conventional MDSM and, in more details, by the modified MDSM, illustrating the efficiency the methods.

General information

State: Published
Organisations: Department of Mechanical Engineering, Solid Mechanics, Russian Academy of Sciences
Authors: Blekhman, I. I. (Ekstern), Sorokin, V. (Intern)
Pages: 75-82
Publication date: 2016

Host publication information

Title of host publication: Procedia IUTAM
Volume: 19

Series: I U T A M. Procedia
ISSN: 2210-9838
BFI conference series: Procedia IUTAM (5010947)
Main Research Area: Technical/natural sciences
Oscillating action, Nonlinear dynamical systems, Slow motion, Small parameter, The method of direct separation of motions
Electronic versions:
Extension_of_the_Method_of_Direct_Separation_of_Motions_for_Problems_of_Oscillating_Action_on_Dynamical_Systems.pdf
DOIs:
10.1016/j.piutam.2016.03.011

Bibliographical note

Source: FindIt
Source-ID: 2303139678
Publication: Research - peer-review › Article in proceedings – Annual report year: 2016