

## عنوان مقاله:

Solution of the Friction-Driven Oscillation Problems Using Piecewise Chebyshev Collocation Method

## محل انتشار:

هجدهمین کنفرانس سالانه مهندسی مکانیک (سال: 1389)

تعداد صفحات اصل مقاله: 5

## نویسندگان:

Hosein Amini Kafiabad - *Mechanical Engineering Department, University of Tehran, Tehran*

Masoud Shariat Panahi - *Mechanical Engineering Department, University of Tehran, Tehran*

Sajad Mirjavadi - *Mechanical Engineering Department, University of Tehran, Tehran*

## خلاصه مقاله:

In this paper, a mass-spring-damper belt system is modeled whilst friction effect is deemed to be the threeterm expansion of belt velocity. The governing equation for the system, which is a differential equation describing a mass position as a function of time, is highly nonlinear consisting of third and second powers of derivatives. The solution of this equation is in some way close to periodic; nevertheless, precise investigation reveals it is aperiodic. Several approaches to solve the governing equations are offered. Firstly, the analytical approximation using perturbation method for some range of the physical parameters of the system is proposed. Secondly, conventional stepwise methods like Runge-Kutta are employed. It takes fairly long time for this class of numerical methods to capture abrupt changes in first derivative. In order to solve the ODE in wider range of parameters and more efficiently, a new method of piecewise Chebyshev spectral collocation method is suggested. This newly proposed method is so well-fitted in the present case. The idea is based on using Chebyshev collocation method piecewisely and applying some tricks to find the boundary conditions for each interval. Since the Gauss-Chebyshev-Lobatto points with non-uniform grid are applied, the benefits of dense grid at the beginning and end of intervals can be exploited to find the boundary of next interval.

## کلمات کلیدی:

friction-driven oscillation, Runge-Kutta, Chebyshev Spectral Collocation, Perturbation method, Gauss Chebyshev Lobatto Points

## لینک ثابت مقاله در پایگاه سیویلیکا:

<https://civilica.com/doc/95483>

