

Branching and Stability of Elastic Rod Equilibrium Forms

Dmitrii Skubov (✉ skubov.dsk@yandex.ru)

Peter the Great Saint Petersburg Polytechnic University: Sankt-Peterburgskij politehniceskij universitet
Petra Velikogo

Dmitry Yu. Kopnin

Peter the Great St Petersburg Polytechnic University: Sankt-Peterburgskij politehniceskij universitet Petra
Velikogo

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Abstract

In our article from the positions of branching theory the classical Euler task about stability of thin elastic rod under action of vertical compressive load is considered. With using of turn-tensor and accompanying vector the deformation of rod is described. In result the conditions of equilibrium in a case of linear determining equation are reduced to boundary problem relatively turn angle of cross section, described by the differential equation of pendulum. With help elliptic functions the diagrams of branching are constructed and are received the exact formulas of rod deformation at the loss of stability of vertical position. Analogy the task of stability of rod at turned force on end of rod is considered. Also, the oscillating loss of rod stability at tracking load is studied.

Full Text

Due to technical limitations, full-text HTML conversion of this manuscript could not be completed. However, the latest manuscript can be downloaded and [accessed as a PDF](#).

Figures



Figure 1

Rod with vertical compressive load

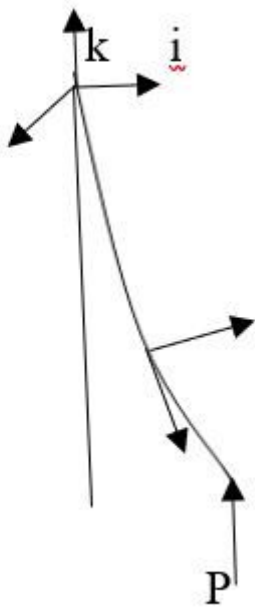


Figure 2

Geometrical model

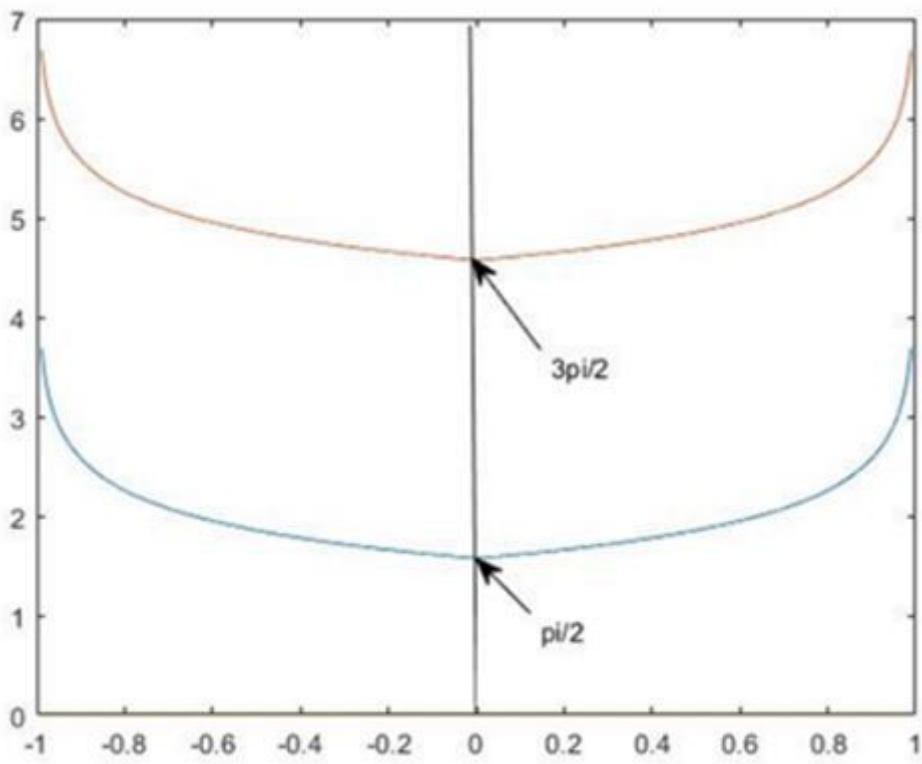


Figure 3

Diagram of branching

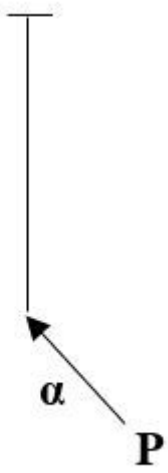


Figure 4

Rod with angular load

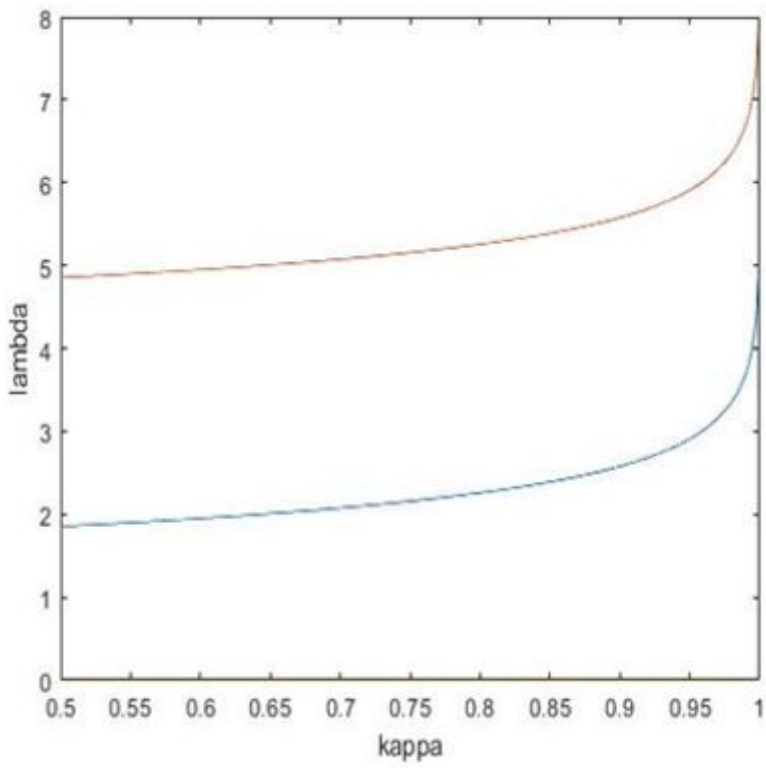
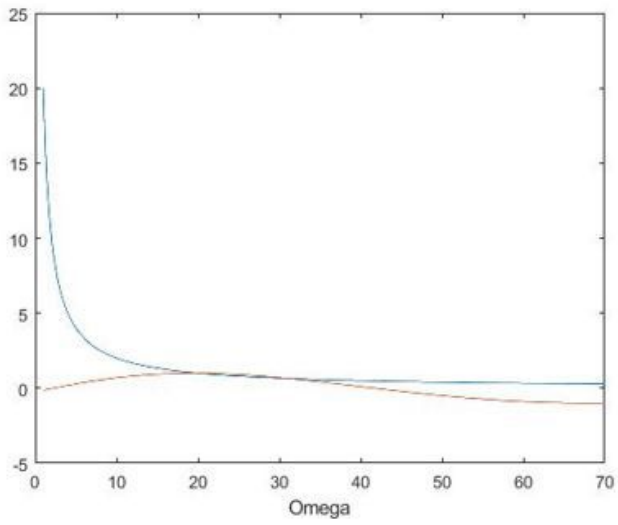
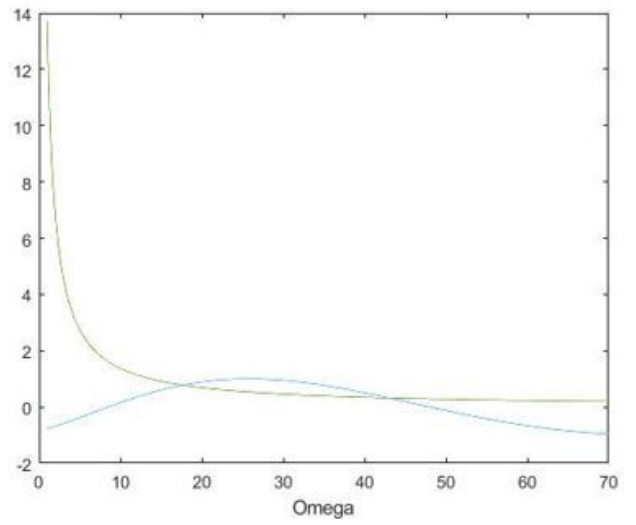


Figure 5

The diagram of branching for turned angle of loading



$$\lambda_* = 4.75$$



$$\lambda = 3.7$$

Figure 6

Graphic solution of task about stability of rod at tracking load