

Design of nonlinear spring for a designated load path

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Summary

The purpose of this research is to propose a design method for displacement path of a curved nonlinear spring (As shown in Fig. 1). The design method is divided the spring into several nonlinear linear spring segments of coordinates to be determined connecting points (nodal points). The relation between external load and displacement is defined by the request of user. The relation between load and displacement of each line segment of the spring is presented by large deformation theorem. The prior known variables are moment of inertia, cross section area, material property and load path. Those variables can be input to the stiffness equations to get equation of coordinate of the connecting points. After solving the coordinate equation, the coordinate of nodal points obtained.

A nonlinear spring is manufactured according to the design coordinates. The large displacement path and rotation angle are measured. Finally, the experiment results are compared with simulation. The verifying results show the feasibility of design method.

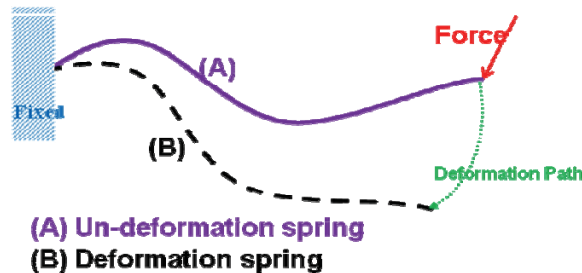


Figure 1: Deformation path of nonlinear spring, (A) is un-deformation. (B) is deformation.

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