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Design and analysis of a novel piezoelectric rotary motor  
with the cyclic symmetric stator

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In  
Mechatronics

By

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# **Abstract**

Piezoelectric motors have been widely employed since 1980s when the first commercial model was invented. Various types of ultrasonic motors have been constructed and manufactured. The piezoelectric motors have been noticed in the last few decades in the field of autofocus cameras, miniature robotics and car applications due to the significant mechanical characteristics such as light-weight, simplicity of design and compact. The aim of this study is to design and analyze a novel piezoelectric rotary motor with the cyclic symmetric stator. Hence, a novel cyclic symmetric stator design with evenly-spaced protrusion fingers was developed. The natural frequencies and mode structures of the cyclic symmetric stator was examined by using the finite element method. The deformation relationship between stator disk and protrusion fingers in repeat and split modes will be discussed in this article. Furthermore, this modeling study focused more on displacement strength and deforming direction of the protrusion fingertips using the Fourier coefficients. The piezoelectric buzzer was attached to the cyclic symmetric stator prototype for driving the stator's natural frequencies. An experimental prototype is built to examine the consistency with the simulation results.

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