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## Strength and Stability Criteria Limiting Geometrical Dimensions of a Cantilever Impeller

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### Abstract

This work delivers a rotordynamics model of a high-velocity impeller of a supercharged engine. This model includes a deformable shaft and deformable disk with blades. The bearings are considered to be compliant rather than rigid. The disk has a cantilever arrangement relative to the elastic supports. The stress-strain state of the rotor system is analyzed within a broad range of the dimensional parameters and the rotational velocities. The critical frequencies are studied for this system as well. It is demonstrated that the first two critical velocities of the cantilever rotor with a massive deformable disk can be modified effectively by appropriate choice of the distance between the supports and their stiffness. As a result the operational range of the rotating velocity can be detuned from dangerous resonance.

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### Topic

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- Propellers and rotors
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