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Berechnung von Torsionsschwingungen an Hand der Theorie der Effektiven Massen

Von der
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Vorgelegt von
THOMAS O'CALLAGHAN
aus Dublin, Irland

Referent: Herr Prof. Dr. G. EICHELBERG
Korreferent: Herr Prof. Dr. M. RAUSCHER

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Summary

This thesis deals with the calculation of both free and forced torsional vibrations by means of the effective inertia method. The method is applied to both discrete (e. g. multi-cylinder engine) and continuous (discs, airplane wings) systems, special attention being paid to the derivation of systematic numerical methods for the various types of problem. Various other methods of solution are compared. Multi-cylinder engines are treated by means of a special „dumb-bell" type oscillator. Continuous systems are analysed by sub-division into sub-systems with known effective inertia transfer characteristies; a nomographical method of solution is suggested.

Graphical methods of solution are discussed and a new method, involving a minimum amount of drawing, based on Baranow's theorem is derived; a proof of this theorem is also given. A nomographic method for deriving the natural frequencies of three-inertia systems is presented.

Formulae governing the variations of effective inertia with frequency are developed. These are used for obtaining better approximations to natural frequencies when only fair approximations are known, and also for determining the effects of slight variations in the system.

A method of solving vibration problems in discrete systems by means of a purely resistive type of electrical analogy is further described.