present strict solution in a high accelerating condition. From experiments for a one degree of freedom vibration rotating system, marked validity of feedforward control for the flexible mechanism is confirmed.

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Unstable Vibration in Hydraulic Servomechanism Controlled by Throttle Valve (Feedback Effect of Sliding Element Displacement)

Shinobu KATO, Etsuo MARUI**, Masatoshi HASHIMOTO***, Iwao HORAGUCHI *** and Katsuyuki SANO***** In this report, unstable vibration occurring in a hydraulic servomechanism controlled by a throttle valve when the feedback circuit of the system is closed is examined. It has been ascertained from the experimental and theoretical considerations that the unstable vibration observed in this experiment was caused by the coupling effect of the system parameters. This hydraulic servomechanism can be stabilized both by increasing the system rigidity and by decreasing the control valve mass. It is important that the system parameters must be established taking into consideration both the inconsistent demands on the control characteristics and the stability criteria.

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Self-Induced Vibration Caused by Spray Valve in Deaerators

Masaya FUNAKAWA and Takakazu ISHIMATSU In a deaerator, which is used for the treatment of feed water of boilers, there have been rarely induced severe vibrations in the shell and spray valve. It has been considered that the vibration is self-induced by coupling between valves and shells. However the detail of the excitation mechanism of the vibration is not yet clear. In this study, the vibration of the valve and the tank wall, pressure in the tank and the flow rate from the valve are measured experimentally through various contractions of the coil spring of the valve and thickness of the tank wall. By these experimental results, it has been concluded that the self exciting mechanism of the vibration is the pressure variation in the tank caused by vibrations of the spray valve and tank wall. Furthermore by the computation of the stability of this system, it is concluded that additional damping in the valve is very effective for the suppression of the vibration.

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Boundary Element Analysis of the Sound Field around a Vibrating Box (Sound Radiation from a Vibrating Gear Box, 1st Report)

Koichi ITO, Katsuhisa SHIBATA and Masana KATO Three dimensional sound fields described by the exterior Neumann problem of the Helmholtz equation are formulated. Application of the boundary element method to this problem is presented. Combined Helmholtz integral equation formulation (CHIEF) is adopted to overcome the numerical difficulty due to the non-unique solution at the eigenfrequencies of the associated interior Dirichlet problem. Numerical accuracies by the present method are examined with the cubic model circumscribed about a uniformly vibrating sphere. Sound fields radiated from a box with one or two vibrating faces are calculated and compared with ones measured in a nearly anechoic room. Results show that the effects of diffraction and interference on the sound fields are well predicted. Distributions of sound intensity level are also simulated.

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Measurement of Form Errors by Phase Difference Method (2nd Report, Roundness of Cylindrical Ground Part)

Takashi NAKAMURA, Koichi FUNABASHI* and Kosei KOSAKA*** A new method for measuring the roundness of a cylindrical ground part is developed. The roundness is measured on a cylindrical grinder by a practical measuring apparatus which has two displacement detectors. The obtained signals are expanded in the Fourier series, and separated into the roundness and the error motion. The calculated result of the roundness agrees approximately with a result measured by a roundness meter. A cause of the difference is disagreement of three undulation spectra. A new method to separate the three undulation spectra into the roundness and the error motion is introduced, and the calculated results agree well with the results measured by a roundness meter. Consequently a possibility of in-process roundness measuring of cylindrical ground parts is indicated.

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A Study on a Sensor for the Force Measurement of a Robot Hand (1st Report, Measurement Method of Force and Moment by Photo-Semiconductor and Evaluation of Experimental Results)

Toshio FUKUDA, Hidemi HOSOKAI and Taizou IRIE In this report, a new measurement method of force and moment for robot applications is shown with the evaluation of experimental results. The force and the moment can be measured by using the characteristic such that the photo-trans-missivity of the photo-semiconductor ($CdInGaS^4$) changes according to the pressure applied on the semi-conductor: as the light radiated from the transmitter reaches the photo-diode through the