


# TRANSACTIONS OF JAPAN SOCIETY OF CIVIL ENGINEERS

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## ON THE BENDING TORSION OF SIMPLY SUPPORTED BEAMS WITH SHAPE SECTION

*By Dr. Eng., Sumio Nomachi, C.E. Member*

**Synopsis :** In the present paper, some formulae concerning the bending torsion of the simply supported beam with  shape section, are described from H. Wagner's and Goodier-Barton's theory; and then other formulae which coincide, in particular case where the span length is much longer than the breadth, with those from H. Wagner's theory, are obtained by the precise analysis. Lastly, the effects of the local torsion due to the side girders are discussed and some numerical values of stresses are given for comparison.

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## ON THE DESIGN BENDING MOMENT OF THE MAIN GIRDER OF THE HIGHWAY GIRDER BRIDGE

*By Hiroshi Yonezawa, C.E. Member*

**Synopsis :** In this paper, the formulas of the design bending moment of the main girder of the highway bridge are induced by the theory of the orthotropic plate. These formulas are induced for the design load which is provided in the Japan new Specifications of Steel Highway Bridge (1955) or the check of abnormally heavy loading. In these formulas various terms,  $D_x/D_y$ ,  $l(\text{span})$  and  $2b$  (effective width) are contained.

Further, the bending moments calculated by author's formulas and conventional formulas are shown by the numerical calculations, and a study on the design bending moment of the skew girder bridge are mentioned.

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## ON THE SEGREGATION OF MIXED FINE AND COARSE GRAINS IN A VIBRATING CUBIC VESSEL.

*By Shigemasa Hasaba, C.E. Assoc. Member*

**Synopsis :** If mixed fine and coarse grains are poured into a vibrating cubic vessel, they do not keep the mixing state, but soon segregate into separate parts.

This paper is a note on experimental investigations on the mechanism of the segregation,

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## FREE STEADY FLOW WITH VERTICAL CURVATURE OF ANY SECTIONAL FORMS

*By Yoshiharu Ida, C.E. Assoc. Member*

**Synopsis :** The author has discussed free steady flow with vertical curvature, in his previous paper, assuming that the cross sectional forms are rectangular approximately. Here, the discussion is extended to the curved free steady flow in any sectional forms. His "D-term" and the condition of control section are given for the parabolic, triangular, trapezoidal and circular section respectively.

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## MECHANISM OF SCOUR AT APRON OF FREE OVERFALL STRUCTURE

*By Kiyosi Kimura, C.E. Assoc. Member*

**Synopsis :** In the explanation of scouring phenomena by free nappe from overfall structure to the apron, Schoklitsch's original idea has got under control, in which the equilibrium condition will exist after certain time, if various factors except time are fixed. While, Rouse and other described that scouring phenomena are variable of the time, in recent times.

The author made experiment of scour referred to the studies of Maurice L. Albertson and Robert Thomas which had been worked more recently. This paper compared this experiment with the past studies which were made on depth of scour and length of scour and deposit.

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## PHOTOELASTIC ANALYSIS OF A GRAVITY DAM SUBJECTED TO VARIOUS LOADS

*By Chuji Mori, C.E. Assoc. Member*

**Synopsis :** By Photoelastic experiments, the stress conditions of a overflow gravity dam section were studied. The dam section was subjected to all main design loads except uplift pressure. The influence of a pier and bucket or sky-jump structure upon the stress condition are discussed. Finally, some considerations of the dam section are described in this paper. Also, some new methods of photoelastic experiment developed by the author are described here.

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## ON THE EFFECTS OF THE INITIAL CONDITIONS ON THE SHRINKAGE FACTORS OF SOIL

*By Ichiro Uchida, C.E. Member, Renzo Matsumoto and Kōichi Matsuo,  
C.E. Assoc. Member*

**Synopsis :** We have examined the effects of the initial moisture content and the mixing method on the shrinkage factors of soil. As the moisture content when mixing increases, shrinkage limit, volumetric change for initial moisture content and the degree of saturation increase, and shrinkage ratio and volumetric change for the field moisture equivalent decrease. For mixing, as the mixing of the soil is carried out longer, shrinkage limit becomes smaller, and shrinkage ratio, volumetric change for the initial moisture content and volumetric change for the field moisture equivalent become larger. The relation and the time of mixing is not clear.

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ON THE RESULTANT LATERAL PRESSURE OF EARTH AGAINST  
A QUAY WALL DUE TO A SURCHARGE

By Matsuhei Ichihara, C.E. Member

**Synopsis :** The increase of the resultant lateral pressure of earth against a wall due to a surcharge was measured by tilting the wall under different conditions of the backfill before surcharging, and the increase of the pressure beyond the the backfill active earth pressure was observed.

Computing the lateral pressure of earth against quay walls, it has been made certain that the increase of the lateral pressure of earth beyond the backfill active earth pressure due to an area load can be computed by applying the method of image to Fröhlich's formulae assuming that  $\nu$  is 3 or 4.

MEASUREMENTS OF LATERAL EARTH PRESSURES ON THE WALL,  
SWUNG BY A VIBRATION EXCITER FIXED ON THE TOP OF IT.  
(EXPERIMENTAL STUDIES ON SEISMIC EARTH PRESSURES  
REPORT-No. 2.)

By Shin Niwa, C.E. Assoc. Member

**Synopsis :** In our first report were given, a large-scale earthquake generator, oscillating soil measuring apparatus and some preliminary measurements of oscillating earth pressures on the test wall during artificial earthquakes.

The next step we took, was to make the wall itself an earthquake source by fixing a small vibration exciter on the top of it. Here are given some results of the lateral earth pressures on this occasion, as well as of the wall vibration at the same time.

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