ENGLISH SUMMARIES

TRANSMISSION OF DISPLACEMENT AND FORCE QUANTITIES OVER ECCENTRIC CONTINUOUS AXIAL JOINTS OF BEAM ELEMENTS HAVING 14 DEGREES OF FREEDOM BETWEEN DIFFERENT OPEN CROSS SECTIONS

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This article gives a method to calculate the transmission of displacement and force quantities over an axial off-set joint with beam elements having 14 degrees of freedom, the cross sections of which consist of three rectangularly connected strips (two flanges and one web.

On the basis of the local sectorial area $\omega_i(s)$ is defined the concept of the generalized sectorial area, $\Omega_i(y,z)$, which is a kinematically admissible biharmonic plate deflection of the nodal plate of the beam under unit warping deformation $\theta'_0(x) = 1$. Its values coincide with the values of the usual sectorial area at the mid-lines of the cross section walls.

The zero-point of the gradient $\nabla\Omega_i$ constitutes for the three-strip cross section a **third special point**. In this article, this point is referred to as the **center of** (flexural) **rotations** (x-derivatives of deflections). It has central importance in the calculation of the transmission of the force and displacement quantities from one element to another over eccentric (off set) joints. On the locus axis of the centers of rotations, the y- and z-derivatives of the imaginary nodal plate's x-displacement $u(x,y,z)$, inclinations $\partial u/\partial y$ and $\partial u/\partial z$ equal in absolute value to the rotations of the torsional (shear) axis, dv/dx and dw/dx, respectively. Loaded at the axis of the centers of flexural rotations by *yz*-plane concentrated moments, the beam bends without twisting.

The transformation matrices given in this article are "exact" within the basic assumptions of the theory of thin-walled beams of open cross section for the case where the strips of the cross sections are hinged along their mid-lines on joint plates and also for the case when the joining cross sections can be thought to be created by removing parts from a third cross section which is also consistent with the basic assumptions.

LINEAR SHEAR WALL MODELS IN MULTISTOREY BUILDINGS

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This study deals with coupled shear wall/frame analysis. The structural components and materials are linearly elastic. Existing methods, like continuous connection and wide-column -frame methods are shortly introduced. The main goal of this study is to verify how the most modern finite-elements with drilling degrees of freedom behave in analysis of shear wall structures with openings.

First reference element is the element of lura and Atluri. It based on the modified variational principle of Reissner. The second element is developed by Kwan and it is strain-based formulated. Third element is formulated in this paper starting from Turner's Q6-element and adding drilling degrees of freedom in to it using penalty function technique.

These elements were programmed in to a test programm. The coupling beams (lintel beams) were Timoshenko beam elements with joint deformations allowed for. These elements and the program were tested by standard element tests. The performance of these elements in shear wall applications were tested using a test wall example frequently used in litterature.

MEASURINGPROCESS OF CALIBRATED HOT BOX APPARATUS IN TUT

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This article deals with a new calibrated hot box apparatus which has been developed in the laboratory of structural engineering Tampere university of technology. By means of this apparatus it could be measured thermal transmittance (U-values) of different structures and thermal conductivity (λ-values) of materials. The planning and development work of the apparatus continued almost two years and it finished in October 1996. The planning work was made according to ISO, CEN and DIN standards and therefore the apparatus fullfills requirements and measuring accuracies of the standars.

The measuring and adjusting system of the apparatus works completely automatically.The apparatus was constructed by means of newest technics in order to get more effective and accurate measuring and adjusting system. The apparatus can measure all thermal values of a test specimen during a couple of days.

The apparatus consists of hot and cold box in which temperature can be adjusted. In standard test temperature is +20 °C in the hot box and 0 °C in the cold box. A test specimen are set in the test hole which is between hot and cold box. During the test it is measured how much heating power is needed in the hot box that the temperatures are constant both side of the specimen. Using these values of power and temperatures it can be calculated all thermal values of the test specimen if the form and size of the specimen is known.