

TESTS ON SPATIAL FRAMES SUBJECTED TO HORIZONTAL
ROTATING LOADS UNTIL THE INCREMENTAL COLLAPSE

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SYNOPSIS

Experimental tests on very simple spatial frames subjected to an horizontal, statically rotating force, until the incremental collapse, entirely financed by the National Research Council (C.N.R.) were carried out, by the writer, at the "Scienza delle Costruzioni" Institute of Naples Engineering University. The experimental results are in accordance with the theoretic results and they are here reported briefly.

TEXT

The hypothesis is accepted that the safety factor of a structure, subjected to earthquake, may be calculated as the safety factor against the incremental collapse or the alternating plasticity due to an horizontal system of unidirectional forces, the intensity of which is proportional to the masses of the structure, statically rotating on the centre of gravity. A very simple spatial frame was examined; it was constructed with four, 1 meter high, IPE 100 steel beams, fixed at the ends, placed vertically at the corners of a rectangle, whose dimensions are 0,8x1,6 meter, and supporting a rigid concrete slab. Two steel beams were placed with the axis of the maximum momentum of inertia parallel to the longest side of the frame, the others with the same axis parallel to the shortest side of the frame; in this way the elastic centroid and the centre of gravity do not coincide. Two frames were tested; they were subjected to an horizontal force, of variable intensity, statically rotating on the geometric centroid of the slab. The failure always occurred by incremental collapse with plasticization at the ends of the steel beams. The incremental collapse load was not greater than 4250 Kg and not smaller than 3750 Kg. The experimental results in the elastic and in the elastic-plastic phase are reported in a paper by the writer (1). The theoretic collapse load was of 3770 Kg, it has been calculated with a general method explained in another paper by the author (2).

- (1) Indagine sperimentale a rottura di una struttura spaziale sollecitata da forze orizzontali rotanti. Giornale del Genio Civile. Roma, Aprile - Giugno, 1974.
- (2) Sulla verifica di sicurezza delle strutture in fase ultra-elastica. Giornale del Genio Civile. Roma, Luglio - Settembre 1975.

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