Simplified Flat Slab Design with Irregular Columns Layout

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Abstract

This paper presents a simplified design method (SDM) to analyze and design the flat plates with irregular column layouts. Theses flat plates having the irregular panels are subdivided into triangular panels. Flexural design formulas for largest triangular slab panel are derived based on the theoretical principles of plate and yield line theories and using the ultimate-strength design method USD under the provisions of ACI building code of design (ACI 318-14). Six different flat slabs with irregular column layouts (FS-1 to FS-6) are selected in this study to be analyzed and designed using the simplified design method approach. Numerical examples for two of the slabs (FS-3 and FS-6) are also presented to illustrate the method capability of designing the flat slabs having irregular column layouts. The selected slab sections (FS-1 to FS-6) are also analyzed and designed using the computer software (SAFE) and the results obtained are compared with the numerical solutions. The percentage difference of simplified design method with the finite element software (SAFE) ranges within 4% to 20% indicates that the SDM is a good and quick approach to design a flat slab having arbitrary/irregular column layout.

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