1993

NASA/ASEE SUMMER FACULTY FELLOWSHIP PROGRAM

MARSHALL SPACE FLIGHT CENTER
THE UNIVERSITY OF ALABAMA IN HUNTSVILLE

A STUDY OF THE CORE MODULE SIMULATOR FLOOR CAPABILITY

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ABSTRACT

The floor of the Core Module Simulator(CMS) is required to support various combinations of dead load and live load during the testing process. Even though there is published data on the structural capability of the grating it is not always evident if the combined loadings with point loads will cause structural failure.

TECHNICAL APPROACH

A mathematical model of the 36 inch by 40 inch floor section was developed. The analysis was performed using finite element techniques. Unit loads were separately placed at the 15 locations shown in Figure 1. The internal moments at all 15 locations locations were determined for each load location yielding a 15 by 15 influence matrix. The total response at any location is determined from the following relationship:

$$\{M\} = [m]\{P\}$$

where $\{M\}$ is a 15 by 1 matrix of the resultant moments at the 15 locations as shown in Figure 1. The 15 by 15 influence moment matrix [m] is developed by placing unit loads at the 15 locations shown in Figure 1, and $\{P\}$ is a 15 by 1 matrix of the applied loads.at these locations.

Once the influence matrix for the internal moments were determined, a BASIC computer program was developed to perform the matrix multiplication and select the maximum internal bending moments of the members.

The program is adaptable to the IBM PC or McIntosh computers The required input is the magnitude and location of the loads. The program also allows for the superposition of a uniform load over the entire floor area. This program written for this unique configuration provides a simplified method for determining the floor capability.

CONCLUSIONS

The solution of the CMS floor capability illustrates how the PC may be used to simplify problem solutions which require a higher level of expertise in a particular area such as structural analysis. this technique can be used in other fields such as electrical or fluid mechanics.

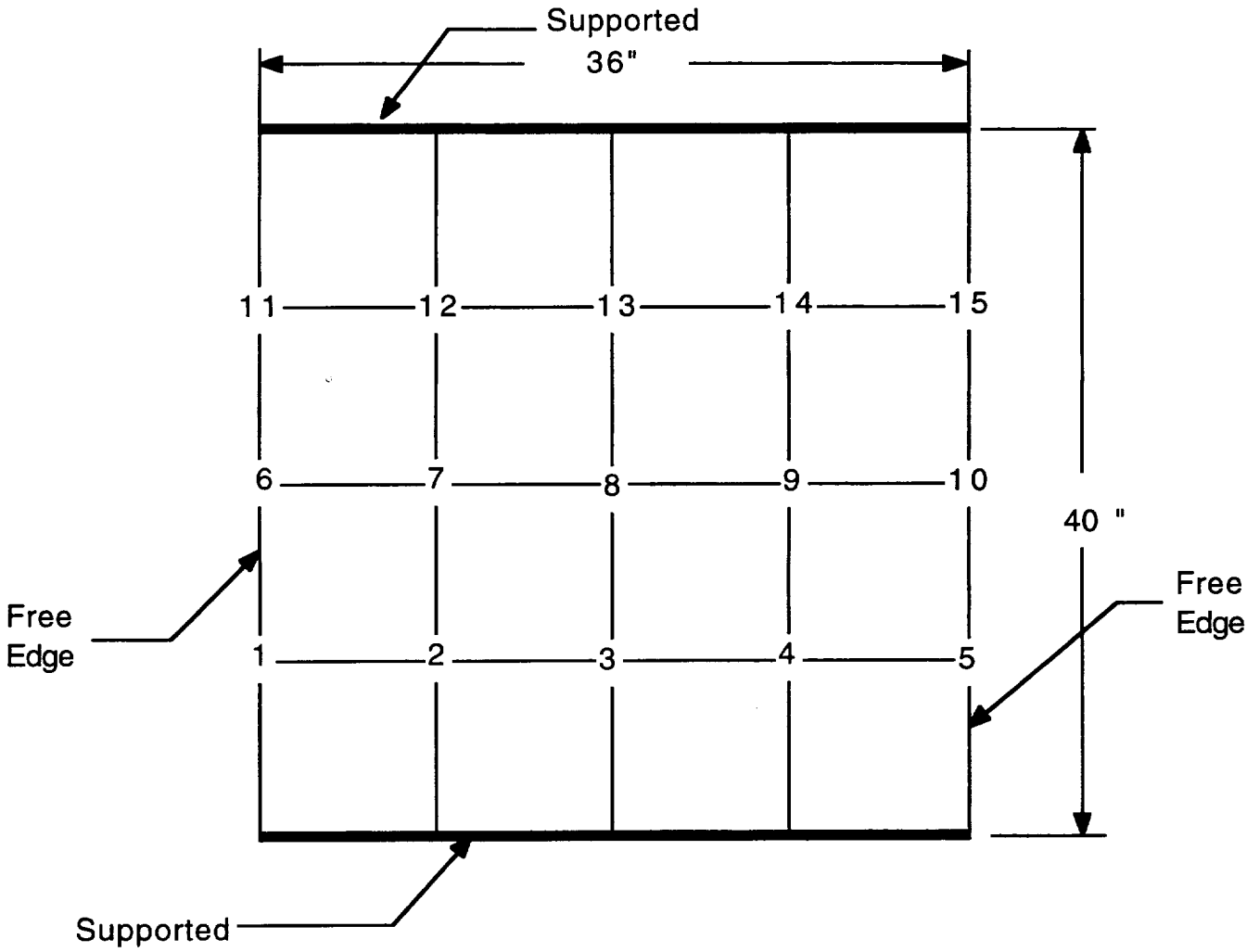

Figure 1 CMS Floor Layout