THERMAL ANALYSIS OF

CRACKED BEAM

by:

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ABSTRACT:

Cracks may occur not only due to submerge of column or support but also moment in structure, shrinkage, creep, change in temperature and others. Reinforcement concrete detailing might lead to thermal cracking and in this study a part of a cracked beam is analysed with respective to thermal changes. The overall structural behaviour of the beam may be influenced due to this crack existence.

This project concerns the temperature distribution on a cracked beam model, when heat is applied. The temperature distribution is determined using ANSYS Software Version 5.0, available at the CADEM Centre, ITM. Temperature selected in the analysis were from 26^0C to 33^0C and four conditions of "applied forces" were applied to the model.

From this study the void area within the crack do not influence the heat distribution but affects the movement due to restrained conditions.

1.0 INTRODUCTION

1.1 General

The change in temperatures can produce stress in concrete structures of the same order of magnitude as the dead or live loads. However, stresses due to temperature are produced only when the thermal expansion or contraction is restrained. High tensile stresses due to temperature often result in cracking of concrete. Once this occurs, the restraint to thermal expansion or contraction of concrete is gradually removed and its stresses reduced.

Most design codes require that temperature effects be considered, although in many cases very little guidance is given on how this can be done. Thermal stresses can be substantially reduced and the risk of damage caused by temperature eliminated by provision of expansion joints and sufficient well-distributed reinforcements. For this reason and because of the complexity of the problem, many structures are designed with virtually no calculation of the effects of temperature. However, for important structures exposed to large temperature variations, for example structures with members of relatively large depth exposed to the weather, it is appropriate to have assessment of the magnitude of temperature variation and the corresponding stress.