

FINITE ELEMENT ANALYSIS ON REINFORCED CONCRETE COLUMN
WITH TRANSVERSE OPENINGS

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ABSTRAK

Dalam pembinaan, lubang sering digerudi untuk menempatkan saluran dan paip bagi perkhidmatan seperti elektrik, bekalan air, telekomunikasi, penghawa dingin dan sebagainya. Kehadiran lubang boleh mempengaruhi prestasi tiang konkrit bertetulang, terutamanya dari aspek kapasiti membawa beban. Kajian ini terutamanya memberi tumpuan kepada pesongan dan retak corak tiang konkrit bertetulang yang mempunyai lubang dengan saiz yang berbeza dan lubang di lokasi yang berbeza. Kajian telah dijalankan ke atas tiang spesimen dengan segi empat tepat keratan rentas 300 mm x 300 mm dan 3800 mm tinggi. Semua spesimen diperkuatkan dengan tetulang membujur 4H 20, tetulang melintang pautan ricih dengan 6 mm dan 250 mm jarak. Analisis unsur terhingga telah dijalankan untuk mengkaji prestasi tiang konkrit bertetulang menggunakan perisian ANSYS. Beban dikenakan sehingga kegagalan model. Hasilnya menunjukkan bahawa pesongan model kawalan adalah yang tertinggi dan pesongan tiang berkurangan apabila saiz lubang semakin meningkat. Pesongan adalah yang tertinggi ketika lubang terletak di tengah model. Untuk corak retak, lebih retak terbentuk apabila saiz lubang bertambah dan apabila lubang terletak lebih dekat dengan beban yang dikenakan.

ABSTRACT

In construction, openings and holes are drilled to place ducts and pipes for accommodation of services such as electricity, water supply, telecommunication, air conditioning and so on. The presence of such openings may influence the performance of reinforced concrete column, especially from the aspect of load carrying capacity. This study mainly focus on the deflection and crack patterns of reinforced concrete column having opening with different sizes and opening in different locations. Study was conducted on columns specimens with rectangular cross-section of 300 mm x 300 mm and 3800 mm height. All columns specimens were reinforced with longitudinal reinforcement of 4H 20, transverse reinforcement of shear links with 6 mm diameter and 250 mm spacing. Finite element analysis was conducted to study the behaviour of the reinforced concrete column using ANSYS software. The load is applied until the failure of the column models. The result shows that the deflection or the deformation of the control column is the highest and the deflection of the column decreases when the opening size of column increases. The deflection is the highest when opening located in the center of column span. For cracks pattern, more cracks are formed when the opening size increases and when the opening located closer to the applied load.