

**FLEXURAL PERFORMANCE OF STEEL FIBER REINFORCED  
CONCRETE BEAM**

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requirements for the award of the degree of  
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I dedicate this work

To my parents

Late Alhaji Muhammad Mallum

And

Hajiya Fadimatu Muhammad Mallum (Hajja Barkindo)

Whose love, kindness, patience and prayer have brought me this far. I thank them

For their love, understanding and support throughout my endeavors

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## ABSTRACT

Steel fibers are generally used as resistance of cracking and strengthening of concrete. According to previous research, it has been found that steel fiber (SF) reinforced concrete beam had higher flexural strength compared to conventional reinforced concrete beam. In this research, flexural performances of steel fiber reinforced concrete beams were studied for concrete grade 35. Optimum fiber content was found to be 1% and this was determined using compressive strength test with different SF dosages (0%, 1% and 2%). Mechanical properties of steel fiber reinforced concrete were determined through compressive strength, tensile strength and flexural strength. The result indicates that there is a slight increment in compressive strength and splitting tensile strength of SFRC of about 15% and 30%, respectively compared to control sample. The flexural strength shows a significant increase of more than 100% at 28 days compared with the control sample. The flexural behavior of steel fiber reinforced concrete beams at 28 days were studied under four points loading and the results were compared with conventional reinforced concrete beam. Beam 1 and Beam 3 failed at almost the same ultimate load. This shows that reinforcing the tension zone only has the same effect to that of reinforcing in both tension and compression zones. Beam 2 with steel fiber has slightly higher ultimate load, although the area of reinforcement was reduced. The use of steel fiber in concrete shows a significant improvement on the ductility and stiffness characteristics of the beams than the control beam.

## ABSTRAK

Gentian keluli selalu digunakan untuk meningkatkan ketahanan konkrit terhadap keretakan dan penguatan konkrit. Penyelidikan yang lepas menunjukkan penggunaan gentian keluli dapat meningkatkan kekuatan lenturan dibandingkan dengan konkrit bertetulang biasa. Dalam kajian ini prestasi lenturan konkrit bertetulang gentian keluli dikaji menggunakan konkrit Gred 35. Kandungan optima gentian keluli yang diperolehi dan digunakan adalah 1% ditentukan menggunakan ujian kekuatan mampatan dengan kandungan gentian berbeza (0%, 1% dan 2%). Sifat-sifat mekanikal konkrit bertetulang bergentian keluli dikaji melalui kekuatan mampatan, kekuatan tegangan dan kekualatn lenturan. Keputusan menunjukkan peningkatan terhadap kekuatan mampatan dan tegangan masing-masing 15% dan 30%, berbanding dengan sampel kawalan. Kekuatan lenturan menunjukkan peningkatan lebih dari 100% pada umur 28 hari berbanding dengan sampel kawalan. Kelakunan lenturan rasuk konkrit bertetulang bergentian keluli pada umur 28 hari ditentukan menggunakan ujian empat titik dan keputusannya dibandingkan dengan rasuk kawalan. Rasuk 1 dan Rasuk 3 merekodkan kekuatan yang lebihkurang sama semasa gagal. Ini menunjukkan penggunaan gentian keluli pada kawasan tegangan sahaja menghasilkan kesan yang sama berbanding dengan penggunaan gentian keluli pada kedua-dua kawasan tegangan dan mampatan. Rasuk 2 yang mempunyai gentian keluli merekodkan kekuatan yang lebih walaupun mempunyai luas tetulang tegangan yang kurang. Penggunaan gentian keluli dalam konkrit menunjukkan peningkatan kemuluran dan kekukuhan rasuk berbanding rasuk kawalan.