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Abstract

The aim of this research is to study the effect of liquid additives on strength and behavior of R.C beam models .

Cracking and deflection of these beam models has been studied .

The liquid additives (High-range water reducing/superplasticizer) in different ratios of cement weight in the range of 0% , 0.4% , 0.8% , 1.2% , 1.6% , 2% have been used .

The compressive strength of concrete was measured at 7and 28 days 0f age and modulus of elasticity of concrete , shear modulus , modulus of volume change , Poison's ratio , deflection and cracking at 28 days . have been calculated .

It became evident from the test results of the compressive strength , modulus of elasticity of concrete , shear modulus , modulus of volume change , Poisons ratio and deflection for the different beams when the additives were used in reinforced concrete model beams in the ratio of 1.6 % of the cement weight achieved the best results .

It can also be concluded that the cracking behavior (both at first cracking stage and at ultimate load) is not affected by additives.

الملخص

إنّ هدفَ هذا البحث هو دراسة اثر الاضافات السائلة على المقاومة والسلوك فى نماذج عارضات خرسانية مسلحة .

استخدمت الاضافات السائلة (إضافات تخفيض ماء خلط الخرسانة بدرجة عالية / السوبريلاستسيزر) بالنسب 0.0 % 0.4% , 0.8% , 1.2% , 1.6 % , 2% من وزن الاسمنت .

وتم قياس مقاومة الضغط فى 7 آيام و 28 يوم و تم حساب معاير المرونة للخرسانة و معايرالقص ومعاير التمدد الحجمى ونسبة بواسون والانحرافات والتشققات.

وضح من نتائج اختبارات مقاومة الضغط ومعاير المرونة للخرسانة ومعايرالقص ومعاير التمدد الحجمى ونسبة بوايسون والانحرافات للعارضات المختلفة ان افضل نتيجة تم الحصول عليها عندما استخدمت نسبة الاضافات 1.6 % من وزن الاسمنت .

واتضح من خلال الدراسة أن التصدعات الناتجة (عند حد المرونة وعند التحميل الأقصى) لم تتأثر بالإضافات .

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List Of Abbreviations (symbols)

Symbol	Abbreviations
h	overall depth of the section
d	effective depth (depth to the centreline of the steel)
d′	inset of the compression steel
b	breadth of the section
L	effective length span of beam
x	depth to the neutral axis
Z	lever arm
v	shear stress
v_c	Ultimate shear stress in concrete
e	Eeccentricity
S_{max}	maximum likely crack spacing
f_{cu}	is the characteristic strength of concrete
f_y	is the characteristic strength of steel
P	ultimate load
m	is the design moment
m_u	is the maximum moment capacity of section
A_s	area of tension reinforcement
$A_{s'}$	area of steel in compression
Φ	diameter of main steel
$Φ_{link}$	diameter of links
K	bulk modulus
G	shear modulus
E_c	modulus of elasticity of the concrete
E_s	modulus of elasticity of the steel
αe	modular ratio, Es/Ec
υ	Poisson’s ratio
C	cover of steel
a	deflection
a_{cr}	distance from surface crack position of zero strain
$ε_c$	strain in the concrete (0.0035)

ε_s	strain in the steel
C_c	force in the concrete in compression
C_s	force in the steel in compression
T_c	force in the concrete in tension
Ts	force in the steel in tension
fcc	stress in the concrete in compression
f_{sc}	stress in the compression steel
f_{st}	stress in the tension steel
fct	stress in the concrete in tension at the level of the tension steel 1 N/mm2 for short-term loads; (0.55 N/mm2 for long-term loads)