( 1 )

Evaluation of Flexural Behavior and Serviceability Performance of Concrete Beams Reinforced with FRP Bars

Chakib Kassem, Ahmed Sabry Farghaly, Brahim Benmokrane

Abstract:

Flexural behavior and serviceability performance of 24 full-scale concrete beams reinforced with carbon-, glass-, and aramid-fiber-reinforced-polymer (FRP) bars are investigated. The beams were 3,300 mm long with a rectangular cross section of 200 mm in width and 300 mm in depth. Sixteen beams were reinforced with carbon-FRP bars, four beams were reinforced with glass-FRP bars, two beams were reinforced with aramid-FRP bars, and two were reinforced with steel, serving as control specimens. Two types of FRP bars with

Published In:

Journal of Composites for Construction, 15 (5), 682-695
Concrete columns reinforced longitudinally and transversally with glass fiber-reinforced polymer bars

Hany Tobbi, Ahmed Sabry Farghaly, Brahim Benmokrane

Abstract:

Using fiber-reinforced polymer (FRP) reinforcing bars as the main reinforcement for concrete structures in harsh environments is becoming a widely accepted solution to overcome the problem of steel corrosion. Due to the relatively lower cost of glass FRP (GFRP) bars compared to the other commercially available FRP bars, the use of GFRP bars in reinforced concrete (RC) structures has been widely investigated. This paper presents an experimental study of the behavior of 350 x 350 mm (13.78 x 13.78 in.) cross-section

Published In:

ACI Structural Journal, 109 (4),
Prediction of punching shear strength of two-way slabs strengthened externally with FRP sheets

Ahmed Sabry Farghaly, Tamon Ueda

Abstract:

Strengthening two-way slabs by using fiber-reinforced polymer (FRP) is experimentally and analytically evaluated. Results show that the punching capacity of two-way slabs can increase to up to 40% greater than that of a reference specimen. A three-dimensional FEM program called 3D CAMUI, which was developed at Hokkaido University, was used to simulate the experimental slabs. Very good agreement is obtained in load-carrying capacity and modes of failure. An analytical model based on the numerical simulation.

Published In:

American Society of Civil Engineers
Cyclic Load Behavior of GFRP-Reinforced Concrete Shear Walls

Nayera Mohamed, Ahmed Sabry Farghaly, Brahim Benmokrane, Kenneth W Neale

Abstract:

Well-designed shear walls can be used effectively as a primary lateral-load resisting system for both wind and earthquake loading in multistory buildings. Glass-fiber-reinforced polymer (GFRP) shows considerable deformability under monotonic and fatigue loading in reinforced concrete structures. In this study, four large-scale mid-rise reinforced concrete shear walls—one reinforced with steel bars and three totally reinforced with GFRP bars—were tested to failure under quasi-static cyclic loading.

Published In:

Canadian Journal of Civil Engineering
An experimental study on the bond-slip relationship between the concrete and steel with stud

K Konno, A Farghaly, T Ueda

Abstract:

Beam type specimens where studs are used as shear connector are prepared to investigate constitutive relations. Parameters are stud height, compressive strength of concrete, stud spacing and steel plate thickness. The influences of these parameters are investigated in this study. The influence of the stud height is evaluated quantitatively and the influences of compressive strength of concrete, stud spacing and steel plate thickness are evaluated qualitatively

Published In:

International Symposium on Connections between Steel and Concrete
Numerical analysis of punching failure mechanism and debonding of slabs strengthened with externally bonded FRP

Ahmed Sabry Farghaly, T Ueda

Abstract:

The external bonding of fibre-reinforced polymer (FRP) sheets to reinforced concrete (RC) structures has emerged as a popular method of strengthening. With this strengthening method, the stress transfer performance of the FRP-to-concrete interface is of crucial importance. Indeed, a number of failure modes associated with FRP strengthened RC members are directly caused by debonding of the FRP from the concrete. The motivation for this work is the fact that, although there is a large amount of experimental data

Published In:

Advanced composite materials in bridges and structures, ACMBS-V, Pierre Labossière and Kenneth W. Neale eds., Canadian Society for Civil Engineering, Winnipeg, Canada
Numerical simulation of mid-rise concrete shear walls reinforced with GFRP bars subjected to lateral displacement reversals

Nayera Mohamed, Ahmed Sabry Farghaly, Brahim Benmokrane, Kenneth W Neale

Abstract:

This study represents a new step in using the finite-element method (FEM) as a powerful tool to simulate the seismic behavior of shear walls reinforced with glass-fiber-reinforced polymer (GFRP) reinforcement, which were tested and demonstrated the method's applicability as a lateral resisting system. The simulation analysis was performed on four large-scale mid-rise reinforced-concrete shear walls—one reinforced with steel bars and three totally reinforced with GFRP bars. Plane-sectional analysis and FE simulation

Published In:

Engineering Structures
Evaluation of a Shear Wall Reinforced with Glass FRP Bars Subjected to Lateral Cyclic Loading

Nayera Mohamed, Ahmed Sabry Farghaly, Brahim Benmokrane, Kenneth W Neale

Abstract:

the establishment of several construction applications of FRP reinforcement, there is a need for a system to resist lateral loads induced from wind and earthquake loads in these constructions. Reinforced concrete shear walls have shown effective performance in resisting lateral loads caused by wind and earthquake loads. Therefore, shear walls are frequently used in parking garages and multi-story buildings exposed to high lateral loading. This research involved testing a shear wall totally

Published In:

APFIS
Numerical Analysis of Punching Shear Failure Mechanism and Strength of Open Sandwich Slab

Ahmed Farghaly, Tamon Ueda, Hitoshi Furuuchi

Abstract:

Effort has been given using non-linear 3D FEM program to predict the punching shear failure mechanism and its strength of steel-concrete open sandwich slabs with stud. In the analysis the stud is modeled by link element whose constitutive model is derived from the authors' experimental study. The results show very good agreement between the analytical and experimental values. Punching shear failure phenomena is carefully examined in the analysis observing predicted concrete cracking pattern and concrete crushing

Published In:

Journal of Structural Engineering
Abstract:

The test results on shear walls with glass fiber-reinforced polymer (GFRP) reinforcement have proven the applicability of such structural members in resisting lateral loads and strongly suggested the necessity of proposing a design procedure for them. The elastic and inelastic deformations were identified and suggestions for appropriate definitions provided. The force modification factor Rd was estimated based on the idealized curve of the tested shear walls. The virtual plastic hinge lp for GFRP-reinforced walls was described.

Published In:

ACI Structural Journal , ,
Aspects of Deformability of Concrete Shear Walls Reinforced with Glass Fiber-Reinforced Bars

Nayera Mohamed, Ahmed Sabry Farghaly, Brahim Bennokrane

Abstract:

The ACI and CSA design codes offer no unified method for evaluating the deformability of fiber-reinforced polymer (FRP) reinforced-concrete (RC) structures, although numerous experimental results for such elements are available. This study discusses the methods for quantifying the deformability in FRP-RC structures. The methods were assessed based on the experimental results of four full-scale RC shear walls: three reinforced with FRP bars and one with steel bars

Published In:

Journal of Composites for Construction
Abstract:

Few studies are available on members reinforced internally with fiber-reinforced polymer (FRP) bars and subjected to compressive axial load; therefore, the behavior of FRP internally reinforced concrete columns has not been well established. In this paper, experimental results of 23 nearly full-scale square concrete columns reinforced transversally with glass FRP (GFRP) and carbon FRP (CFRP) ties, and longitudinally with GFRP, CFRP, and steel bars, and subjected to concentric monotonic axial compression

Published In:

ACI Structural Journal , ,
Behavior of Concentrically Loaded Fiber-Reinforced Polymer Reinforced Concrete Columns with Varying Reinforcement Types and Ratios

Hany Tobbi, Ahmed Sabry Farghaly, Brahim Benmokrane

Abstract:

Fiber-reinforced polymer (FRP) materials have proven their effectiveness as an alternative reinforcement for concrete structures in severe environmental conditions. Many studies have investigated the flexural and shear behaviors of FRP-reinforced concrete beams and slabs. Limited research, however, has gone into investigating the behavior of internally reinforced FRP concrete columns. This paper reports the experimental investigation of the compressive performance of concrete columns reinforced

Published In:

ACI Structural Journal
CYCLIC LOAD BEHAVIOR OF GFRP REINFORCED CONCRETE SHEAR WALL: EXPERIMENTAL APPROACH

Nayera Mohamed, Ahmed Sabry Farghaly, Brahim Benmokrane, Kenneth W Neale

Abstract:

With the establishment of several construction applications of FRP reinforcement, there is a need for a system to resist lateral loads induced from wind and earthquake loads in these constructions. Reinforced concrete shear walls have shown effective performance in resisting lateral loads caused by wind and earthquake loads. Therefore, shear walls are frequently used in parking garages and multi-story buildings exposed to high lateral loading. This research involved testing a shear wall totally

Published In:

Canadian Journal of Civil Engineering
Analytical Computation of the Punching Shear Strength of Open Sandwich Slab

Ahmed Farghaly, Tamon Ueda, Hitoshi Furuuchi

Abstract:

In the numerical analysis of engineering problems, it is often necessary to properly model the behavior and effects of discontinuities and interfaces. The parameters of the experimental and analytical programs were the concrete compressive strength and shear span-depth ratio. Discrete and smeared ways of analysis of the bond link element were used. Effort has been given using non-linear 3D FEM program to predict the punching shear failure mechanism and the crack pattern of open sandwich slabs. Based on the analytical

Published In:

JCI Structural Journal


Abstract:

EXPERIMENTAL analysis of reinforced shear-wall with glass-fiber reinforced polymer (GFRP) showed its applicability in resisting lateral loads with no strength degradation, acceptable deformation capacity and energy dissipation as illustrated in an earlier article by the authors. The observed performance of GFRP-reinforced shear walls strongly suggested the necessity of proposing design procedure for such lateral resisting member. To propose design guidelines, however, determination of the elastic

Published In:

APFIS , ,


Evaluation of GFRP-Reinforced Shear Walls

Nayera Mohamed, Ahmed Sabry Farghaly, Brahim Benmokrane, Kenneth W Neale

Abstract:

The paper describes a comprehensive experimental program involving 4 large- scale wall specimens, one reinforced with steel bars (as reference) and three totally reinforced with GFRP bars. Reinforcements were detailed to represent single medium-rise shear wall in regions of low to moderate seismic risk. All walls failed due to concrete compression failure, reaching their flexural capacities with no strength degradation, controlling shear, sliding shear, and anchorage failures. The results show recoverable

Published In:

ACMBS/V...
Abstract:

Nine one-way concrete slabs reinforced with carbon-FRP bars were constructed and tested to failure under two-point loading. The effect of reinforcement ratios, bar diameters, and various concrete compressive strengths were investigated to determine the concrete's contribution to shear strength. Slab structural behavior in terms of crack patterns, modes of failure, and ultimate capacities were examined. All slabs ultimately failed in shear that caused rupture and complete separation of both parts of the slab. One of the tested

Published In:

ACMBS/v,v
FATIGUE BEHAVIOR OF RC SLABS STRENGTHENED EXTERNALLY WITH CFRP SHEETS

Ahmed Sabry FARGHALY, UEDA Tamon

Abstract:

In this paper, the strengthening of two-way slabs using CFRP sheets is evaluated experimentally. The reinforcement ratio equal to 1.29% was chosen to serve the purpose of demarcating the punching shear failure mode. Results show that the punching capacity of two-way slabs can increase to 40% over that of the reference specimen. However, since bridge deck slabs directly sustain repeated moving wheel loads, they are one of the most bridge elements susceptible to fatigue failure. Therefore, this research is designed to

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Structural Journal , ,