(12) PATENT APPLICATION PUBLICATION
(19) INDIA
(22) Date of filing of Application :20/07/2026
(21) Application No.202621088227 A
(43) Publication Date : 04/09/2026

(54) Title of the invention : A Structural Reinforcement Method for Prestressed Concrete Beams Employing Fibre-Reinforced Polymer Laminates

(51) International classification	:E04G 23/02, E04C 3/26, E04C 3/293, E04C 5/08, E04B 1/16
(31) Priority Document No	:NA
(32) Priority Date	:NA
(33) Name of priority country	:NA
(86) International Application No Filing Date	: :01/01/1900
(87) International Publication No	: NA
(61) Patent of Addition to Application Number Filing Date	:NA :NA
(62) Divisional to Application Number Filing Date	:NA :NA

(71)**Name of Applicant :**
1)Dr. A. Narender Reddy
Address of Applicant :Department of Structural Engineering, Sanjivani College of Engineering, Kopargaon, Maharashtra, India – 423603. Maharashtra India
2)Mr. P. Rama Rao
3)Dr. G V L N Murthy
4)Dr. A. Venkatakrishna
5)Dr. V. Gajendra
6)Mr. D. Satish
7)Mr. Syed Amjad Peer Quadri
8)Dr. Bypaneni Krishna Chaitanya
(72)**Name of Inventor :**
1)Dr. A. Narender Reddy
2)Mr. P. Rama Rao
3)Dr. G V L N Murthy
4)Dr. A. Venkatakrishna
5)Dr. V. Gajendra
6)Mr. D. Satish
7)Mr. Syed Amjad Peer Quadri
8)Dr. Bypaneni Krishna Chaitanya

(57) Abstract :
The present invention relates to a strengthening system and method for prestressed concrete members using externally bonded glass fibre-reinforced polymer (GFRP) laminates applied to the tensile surface, such as the soffit, of the member. The laminate comprises chopped strand mat, woven roving, unidirectional fibre cloth, or a combination thereof, bonded to the concrete via an adhesive layer, with laminate configuration and thickness selected according to concrete grade, prestressing arrangement, and required performance improvement. To validate the system, fourteen post-tensioned concrete beams were fabricated using M35 and M60 grade concrete, with two beams retained as unstrengthened controls and twelve strengthened using GFRP laminates of 3 mm and 5 mm thickness. The beams were surface-prepared, bonded, cured, and tested under static two-point loading until failure, with yield load, ultimate load, deflection, stiffness, ductility, crack width, and energy absorption recorded. Results were further validated using finite element modelling and regression analysis. The strengthened beams exhibited significant improvements in load-carrying capacity, stiffness, ductility, crack control, and energy absorption compared to controls, with unidirectional cloth laminates and increased thickness producing the greatest gains. The invention thus provides a lightweight, corrosion-resistant, and minimally intrusive strengthening solution for rehabilitating prestressed concrete structures, supported by a predictive analytical and numerical design method.

No. of Pages : 23 No. of Claims : 3