# Masters Desertion Showcase
# Year 2023

## Department: Civil Engineering

Programme: Masters in Engineering

Specialization: Structural Engineering

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| 1 | **Title of the Thesis**<br><br>Numerical Study on continuous concrete beams reinforced with BFRP bars |
| 2 | **Abstract**<br><br>One of the most important aspects of modern design is the durability of building structures. The lifespan of reinforced concrete structures is reduced by corrosion of the steel bars. Corroded internal steel reinforcement loses strength, which increases the vulnerability of the RC structure to failure. BFRP reinforcement can provide an effective, sustainable, and durable solution. The non-corrodible nature of basalt fibre reinforced polymer (BFRP) bars along with their high strength and light weight make it attractive as reinforcement especially for structures exposed to aggressive environment. Comparatively few experimental studies have examined the behaviour of continuous concrete beams reinforced with BFRP bars. Recent design guidelines for FRP-reinforced structures are not considering the BFRP bars due to a lack of research in this field. The aim of study is to investigate the structural behaviour of continuous concrete beams reinforced with BFRP bars. This thesis presents the finite element modeling of two-span continuous concrete beams using Atena 2D software. The developed finite element model was used to conduct parametric study. Total of fourteen FE models were developed for parametric study by changing one factor at a time to determine the effect of compressive strength, top reinforcement ratio, bottom reinforcement ratio and material of reinforcement on structural behaviour of continuous concrete beams reinforced with BFRP bars. The results of FE modeling were validated and found to be in good agreement with experimental study. The parametric study concluded that load carrying capacity was enhanced while deflection was decreased by increasing the compressive strength, bottom reinforcement ratio and top reinforcement ratio. The damage was also decreased by increasing the compressive strength, bottom reinforcement ratio and top reinforcement ratio. BFRP reinforced continuous concrete beam had more ultimate load and deflection than steel reinforced beam prior to failure. Localized damage was observed in steel reinforced continuous concrete beams. |
| 3 | **Impact on Sustainability of Urban Regions or SDG-11 “Sustainable Cities and Communities”**<br><br>Corrosion attacks on steel are more likely to occur on bridge decks, offshore structures, and structures close to the water that shorten life serviceability of concrete structures. When steel is corroded then members start to weaken and at the end of day structure get failure. So, there should be such material which can be used instead of steel with additional non-corrosive behaviour. The use of basalt fibre-reinforced polymer (BFRP) bars as an alternative reinforcement in concrete structures has emerged as an innovative solution to the corrosion problem of steel reinforcement. |
| 4 | **Scholar Name**<br><br>Rajesh Kumar<br>(0340-3937421 and 0330-8567632)<br>kumar.pg3400021@cloud.neduet.edu.pk |
| 5 | **Supervisor & Co-supervisor**<br><br>Name Prof. Dr. Abdul Jabbar Sangi<br>0345-2251155<br>ajsangi@cloud.neduet.edu.pk |