# Flexural performance of layered PET fiber reinforced concrete beams

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In recent years, plastic wastes represents one of the main threats to the environment. However, the use plastic fibers in concrete could be a sustainable solution to the problem of plastic waste accumulation. Moreover, the use of fibers in the production of concrete is one attempt to remedy this brittleness and to enhance other properties such as toughness and ductility. In this study, polyethylene terephthalate (PET) fibers produced from waste plastic bottles was used in reinforced concrete RC beams. PET fibers were included in concrete at two percentages (0.5% and 1% by volume). The influence of layered distributions of PET fibers in concrete on the flexural behavior of beams was also evaluated. For each mix, three layered PET fibers RC beams were prepared. Comparison with beam containing the same PET fiber percentage (full section) was presented as well. The flexural test parameters included the determination of first cracking, the yield, and the ultimate load, in addition to the deflections related to these loads. Furthermore, failure modes, toughness, and ductility were also evaluated. The use of PET fiber concrete with a layered distribution enhanced the ultimate load considerably. Moreover, the load–deflection relationships illustrated a tendency of layered PET fibers concrete beams to exhibit further deflections before failure. The toughness capacity approximately doubled for beams reinforced with 1% PET fibers concrete in the bottom quarter, bottom half, and top half sections of layered RC beams. This impressive enhancement of the flexural toughness and ductility using the layered distribution is a promising finding that could promote this type of sustainable concrete in various structural applications.