

## Efficient Modelling of Steel-Concrete Composite Beams Using Fastener Elements: A Computational Approach

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**Abstract :** The efficiency and effectiveness of steel-concrete composite beams have become essential within the structural engineering domain, especially when shear connectors are being used. Although they perform effectively, traditional modeling of shear connectors requires a lot of computing time while doing non-linear finite element analysis. In order to solve this, fastener elements were introduced as an alternative to shear connectors in this investigation. Non-linear finite element analysis was employed to numerically confirm experimental work on composite beams. This method significantly reduced computation times while keeping adequate accuracy of predictions intact. A thorough nonlinear finite element study was carried out, changing variables like the fastener element diameter and fastener element spacing. The results show that this approach maintains its structural stability while enhancing computational efficiency, presenting valuable details that will help optimize the design of composite beams.

**Keywords :** composite beam, fastener element, finite element analysis, shear connector

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