Chapter 2
Objectives and Research Significance

2.1 Objectives

The main objective of this Ph.D. thesis is to study the different parameters affecting the shear behavior of concrete reinforced with steel fibers. It also aims to determine the influence of the different parameters involved and examine certain design Codes, with particular reference to the role of fiber reinforcement.

2.2 Specific Objectives

After a thorough study of the literature dealing with shear forces, the behavior of fiber reinforced concrete (FRC) beams was analyzed. Particular attention was devoted to the behavior of both precast elements and those made in situ in a number of experimental tests.

This Ph.D. thesis tries to provide answers to some issues that are still the subject of enquiry in the research community.

The specific objectives are the following:

- To conduct a review of the literature with particular attention to how the phenomenon has been analyzed in both traditional reinforced concrete and prestressed elements. An additional aim is to compile an extensive bibliographical database to facilitate consistent parametric analysis.
- To analyze the influence of fibers in the context of size in the form of the shear behavior of large concrete beams.
- To study the influence of flange size in prestressed double-T beams.
- To analyze the different shear responses obtained from concretes of different toughness by the use of different fiber content and geometry. For this, the shear behavior, failure modes and the validity of design formulas recommended by a number of building codes were analyzed.

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- To analyze the shear behavior of Hollow Core Slabs made of fiber reinforced concrete, which is of great interest due to the difficulties involved in fitting transverse reinforcement in these elements.
- Analysis of an extensive database to verify the standards in Current Codes.

2.3 Final Considerations

Possible improvements of the current building codes was considered to be more important than proposing a new shear formula as Regan has pointed out [1]: "The most imposing analyses have often given excellent correlation with known results but failed miserably to predict behavior in untried circumstances. For simpler models the problem is mostly that of the need to neglect secondary factors, while what is secondary in one case may be primary in another. This is not to question the desirability of models, or of refined analysis at least as a research tool, but to point to the need for very careful verifications. It also points to the fact that significant improvements for design are very likely to be initiated by experimental observation".

This thesis will therefore focus on a deeper understanding of the parameters that influence shear strength and try to identify any possible defects in existing design formulas.

On the other hand, "the use of steel fibers in concrete mixtures has not yet been fully utilized by the concrete industry for several reasons: steel fibers are often considered expensive and [2] the shear behavior of concrete containing steel fibers is still not fully understood. It is important to better understand and predict the shear behavior of SFRC for its wider applications in the concrete industry" [3].

Without any doubt Regan's claim [1] invites us to reflect and leaves no-one indifferent: "Research on shear: a benefit to humanity or a waste of time?"

References

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3. Slater, E., Moni, M., and Alam, M.S. 2012. Predicting the shear strength of steel fiber reinforced concrete beams. *Construction and Building Materials* 26: 423–436.

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