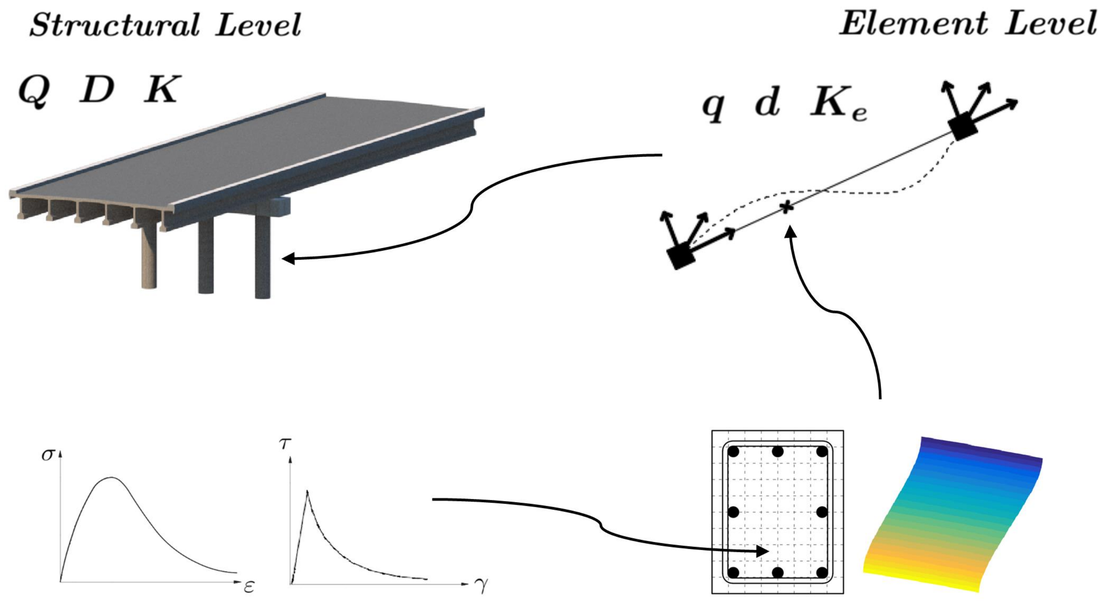
A framework for 3D nonlinear analysis of reinforced concrete frames under general loading

Introduction

- Tool for nonlinear analysis of 3D frame reinforced concrete structures under **general load conditions**.
- Simulation of **different failure modes** (shear, torsion, bending, axial and coupled)
- Plastic-damage 3D constitutive with evolutive dilatancy for concrete.
- B-Spline sectional model with total interaction.
- Force based frame element with different order sectional models at the integration points.

Framework and models



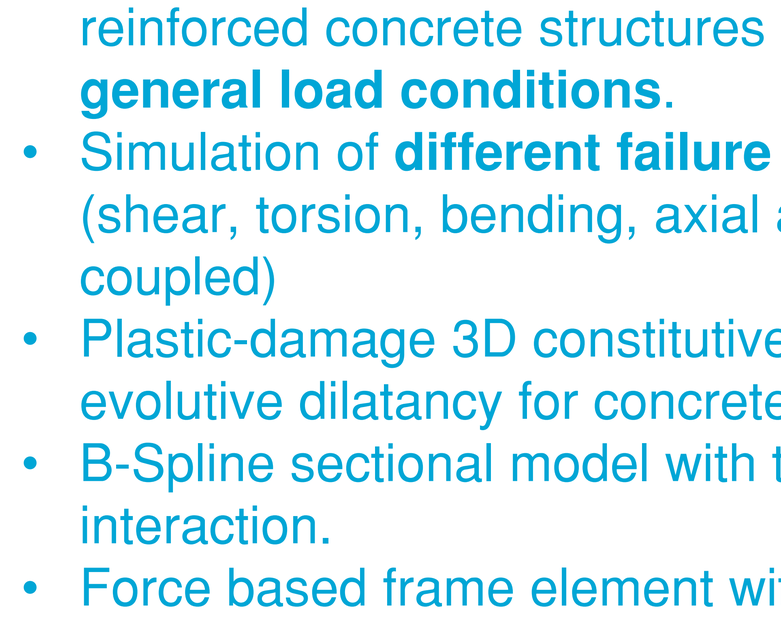
$\sigma \quad \varepsilon \quad C$

Material Level

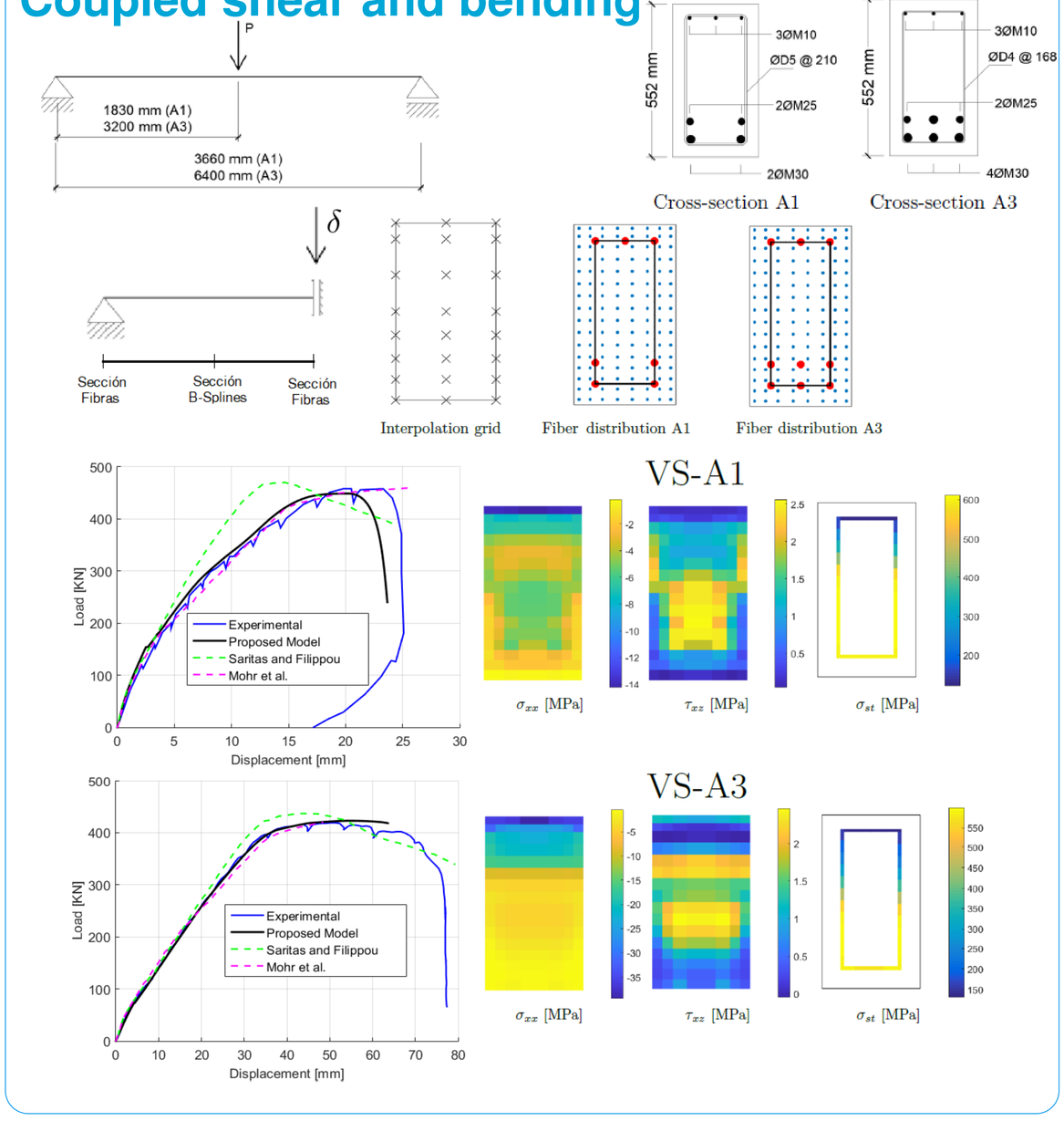
$s_s \quad e_s \quad K_s$

Sectional Level

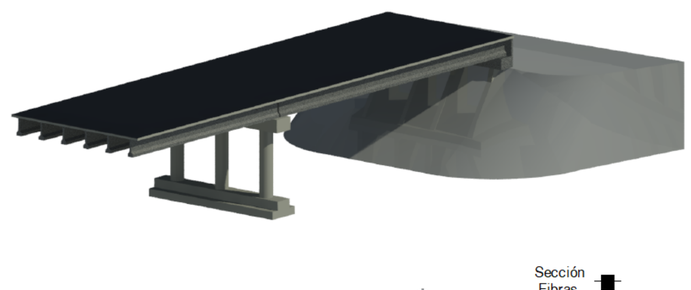
Coupled torsion and bending

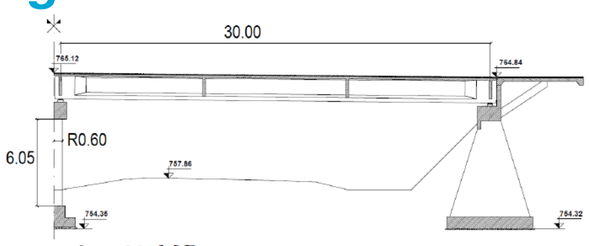


Coupled shear and bending



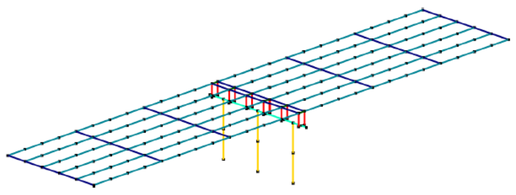
Seismic Performance of a Bridge



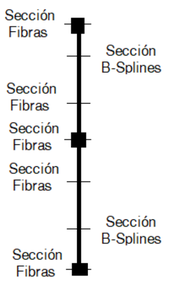


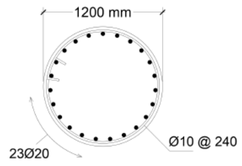
$f_c = 30\ MPa$

$f_y = 420\ MPa$

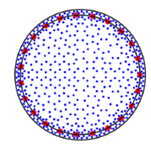


Bridge mesh

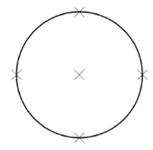




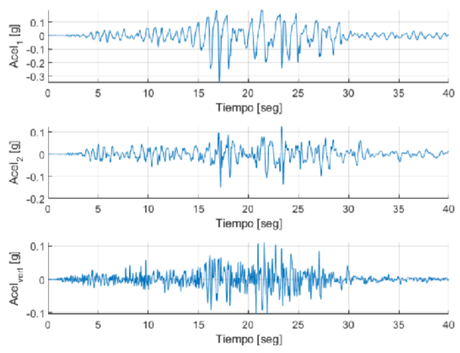
Column cross-section



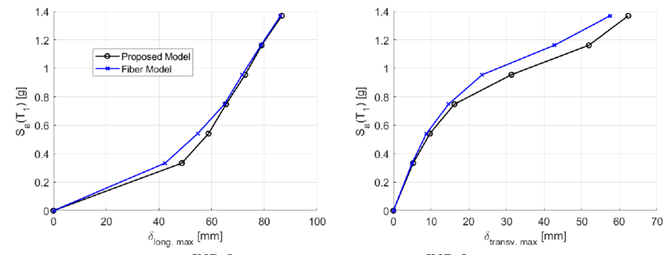
Fiber distribution

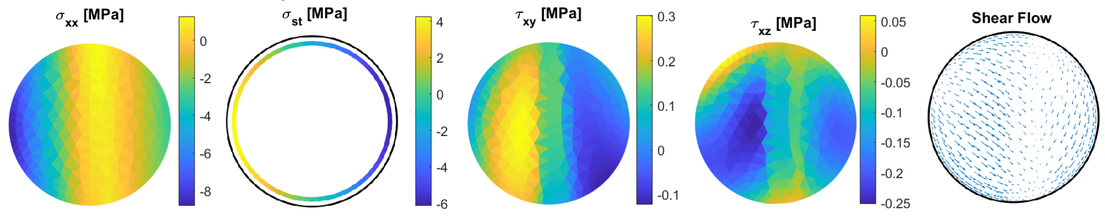


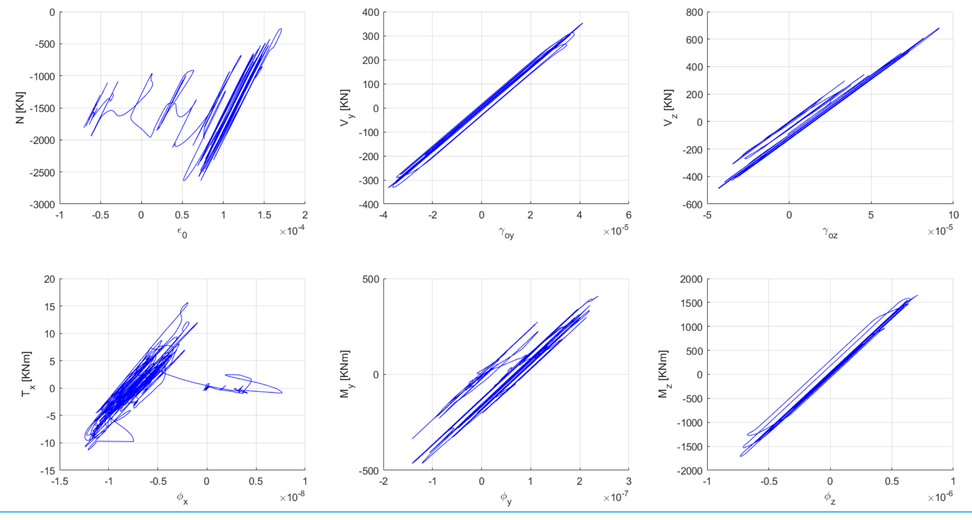
Interpolation grid



Return Period [years]	Annual Frequency	Intensity a_G [g]
43	0.02326	0.10
72	0.01389	0.14
108	0.00926	0.17
475	0.00211	0.35
1033	0.00097	0.48
2475	0.00040	0.64







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