



Practical Steps To Extend the Lives of Bridges

Engineers Ireland,
22 Clyde Road, Ballsbridge, Dublin 4, Ireland
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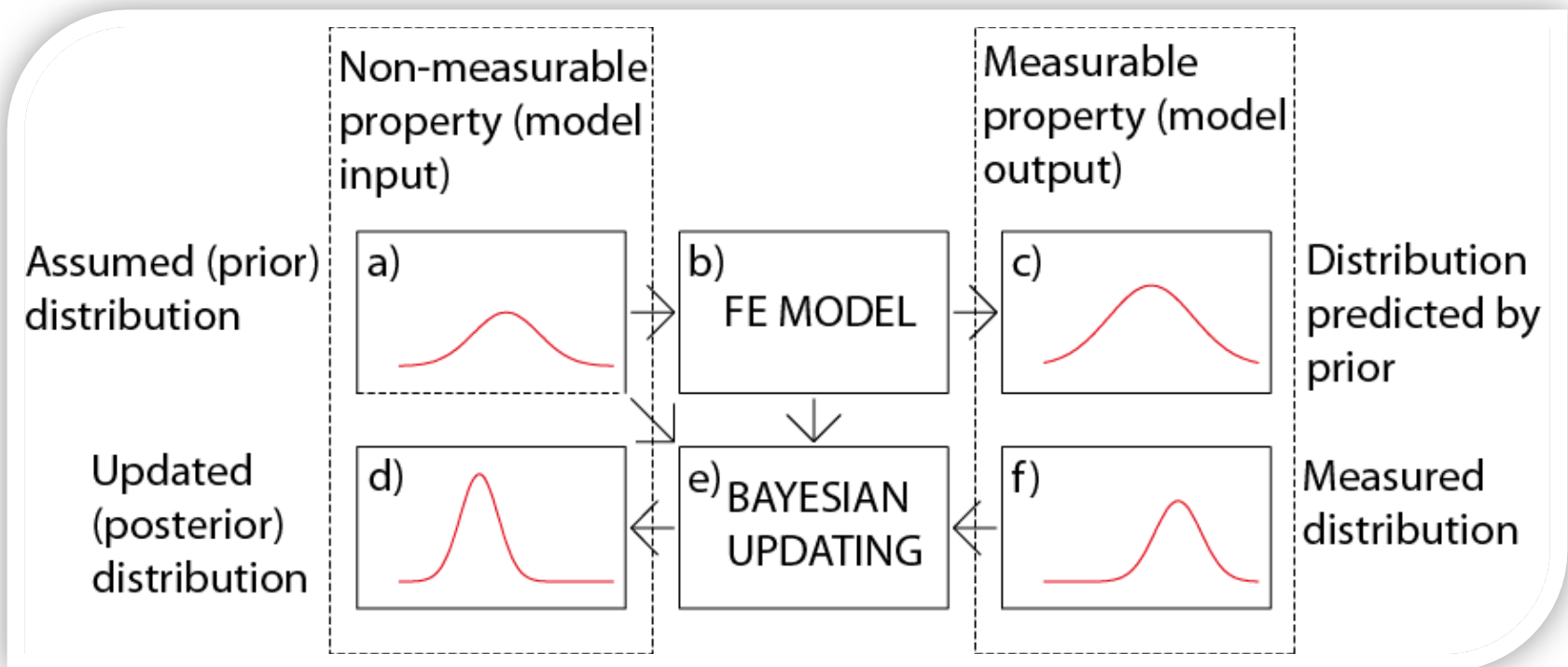
Understanding the Effects of Cold Climate in Railway Bridges

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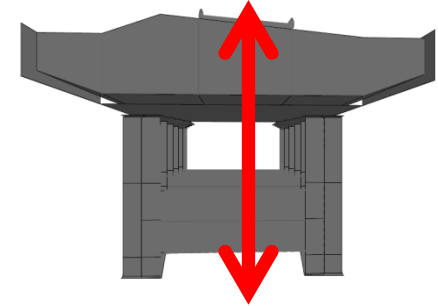
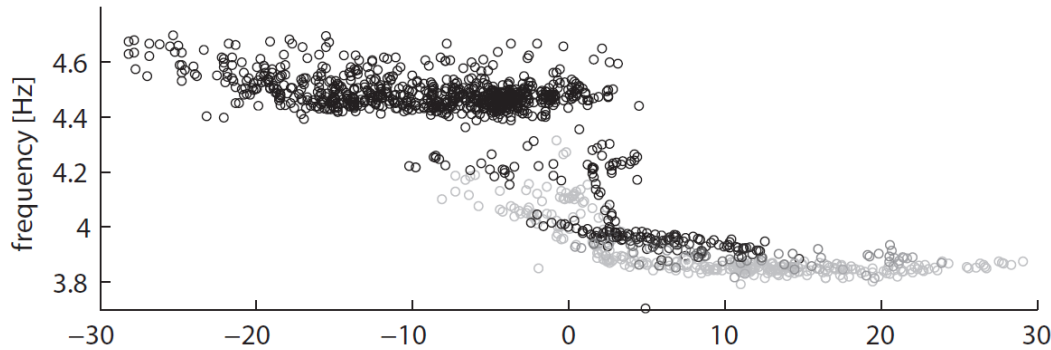
Sweden

Seasonal effects on the stiffness properties of a ballasted railway bridge

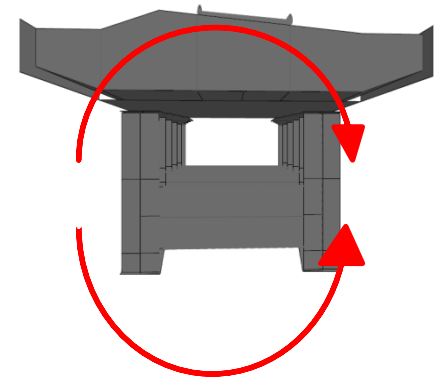
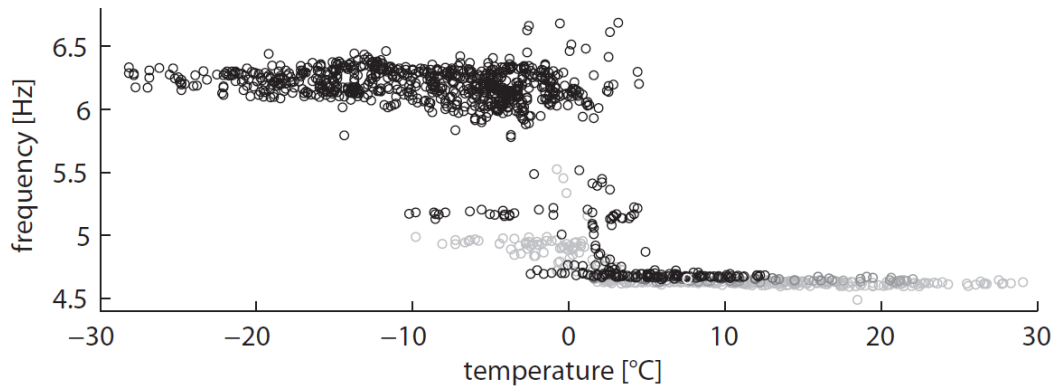


Measured vibration frequencies

first vertical bending mode



first torsional mode

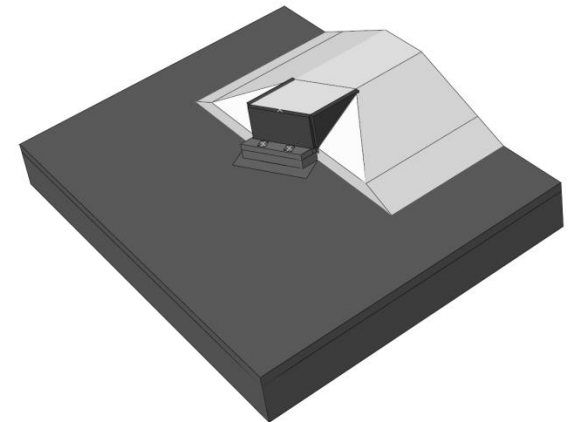
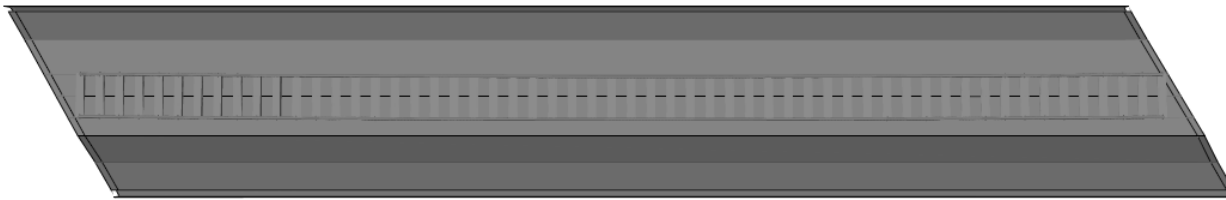




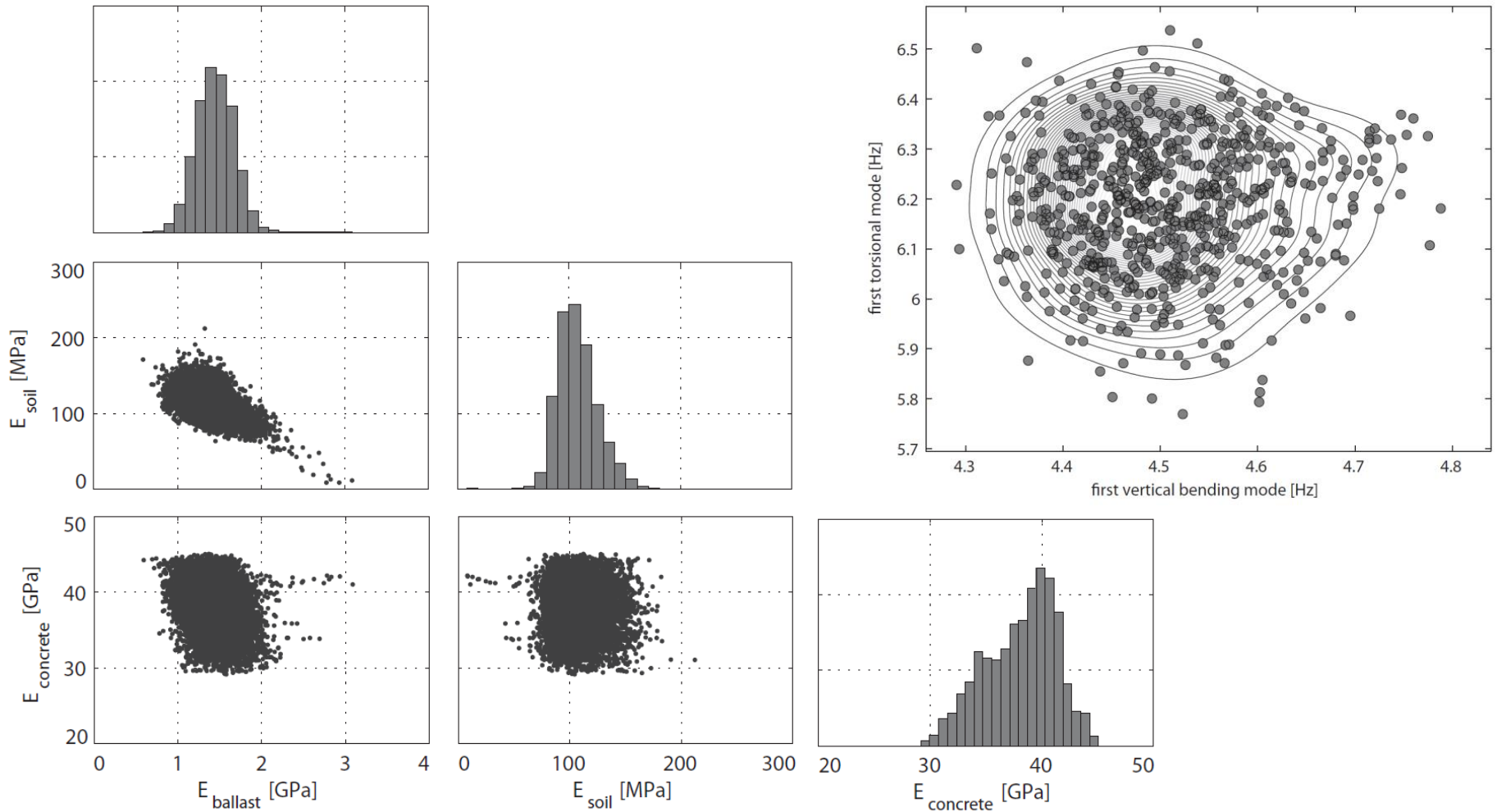
Finite Element

Parameters studied

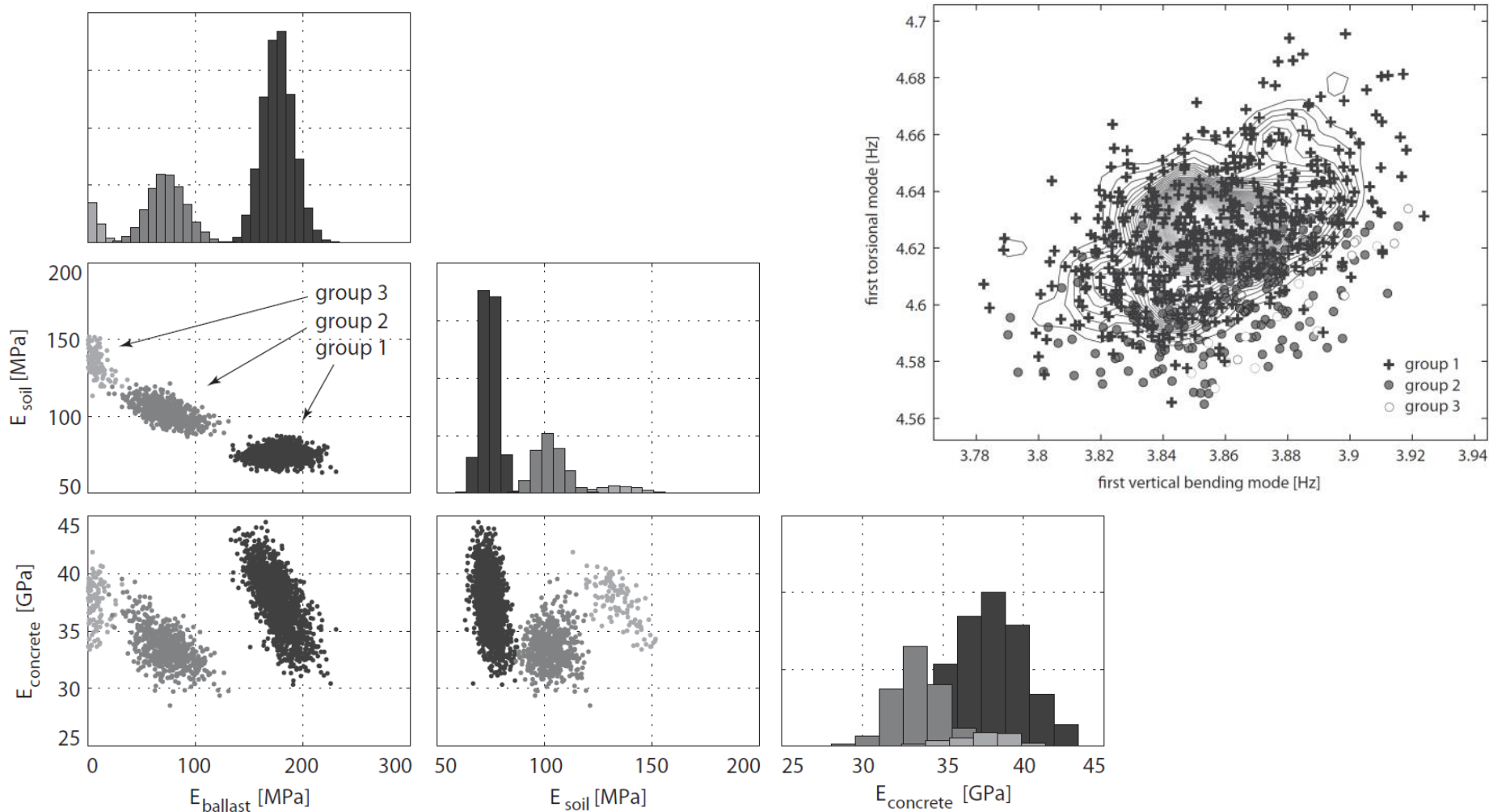
- Rolling resistance
- Soil stiffness
- Ballast stiffness
- Concrete stiffness



Results cold season



Results warm season



Comparison

	Warm season	Cold Season
• Soil stiffness	75 ± 10 MPa	110 ± 30 MPa
• Ballast stiffness	190 ± 30 MPa	1400 ± 400 MPa
• Concrete stiffness	37 ± 7 GPa	37 ± 7 GPa

A very important effect for the evaluation of existing structures in cold climates.

Thank You

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Project Website

www.longlifebridges.com

Acknowledgement

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