Track 21 workshop

The effect of fibre reinforcement on the mechanical response of ballasted track

Edgar Ferro
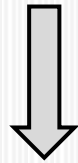**ef1r13@soton.ac.uk**

Faculty of Engineering and the Environment

Infrastructure Research Group

University of Southampton

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Outline

- Aim

- Actual work

- Future work

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Aim

Based on scaled triaxial tests, random fibres
reinforcement improves the performance of ballast

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Improving the understanding of fibre
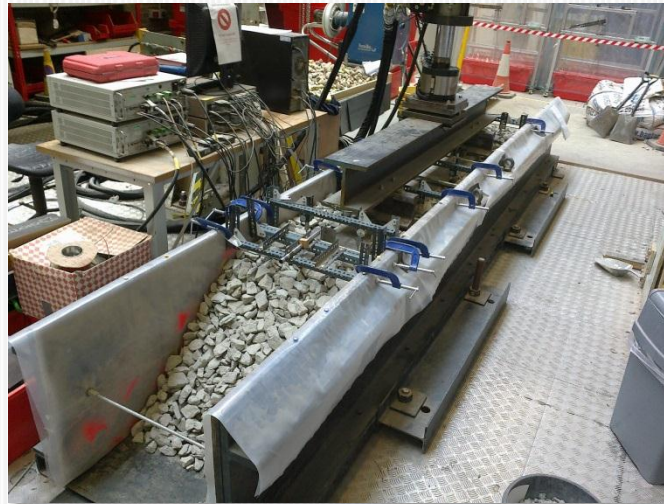reinforced ballast mechanical response

Full size tests
+
FEM and/or DEM

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Actual work

Baseline
full size test

- Monoblock G44 sleeper
- Network Rail ballast
- 30 cm ballast layer
- 1/1 shoulder slope
- No fibres reinforcement

Future work

Sleeper		Monoblock G44
Ballast		Network Rail gradation
Fibres	Material	Polyethylene (PE)
	Thickness	t = 1 mm
	Length	$L_N = 7.5 \div 12.5$ (L = 300 ÷ 500 mm)
	Width	$W_N = 2.5 \div 5.0$ (W = 100 ÷ 200 mm)
	Content	$V_f = 1.0 \div 2.5$ %

$$L_N = \frac{\text{fibres length}}{\text{average particles size}} \qquad W_N = \frac{\text{fibres width}}{\text{average particles size}} \qquad V_f = \frac{\text{volume of fibres}}{\text{volume of particles}}$$

Thank you!

Any questions or suggestions?