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Real Time Detection of Low Adhesion in the Wheel/Rail Contact

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The University Of Sheffield.



The University of Nottingham

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“Real Time Detection of Low-Adhesion in the Wheel Rail Contact”



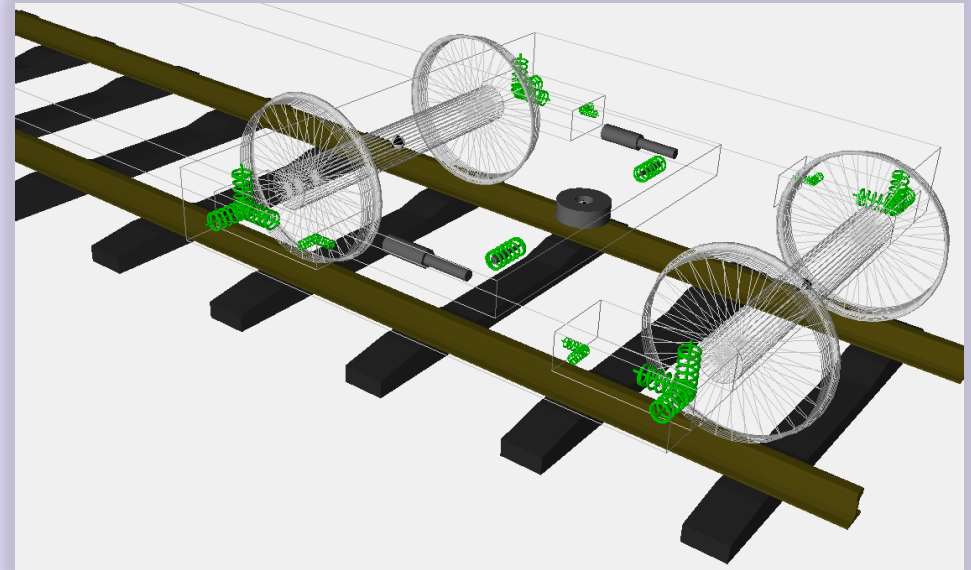
What is low adhesion?

- Braking relies on contact friction
- Reduced by
 - Leaf contaminant
 - Rain and ice
 - Oil contaminant
 - 'Micro-wetting'
- SPADs
 - Cat. A ≈ 300 /year
 - Stonegate cl. 375, 8/11/2010
 - Train at 100kph
 - Expected to stop in 1240m
 - Took 5180m, 3940m past the station



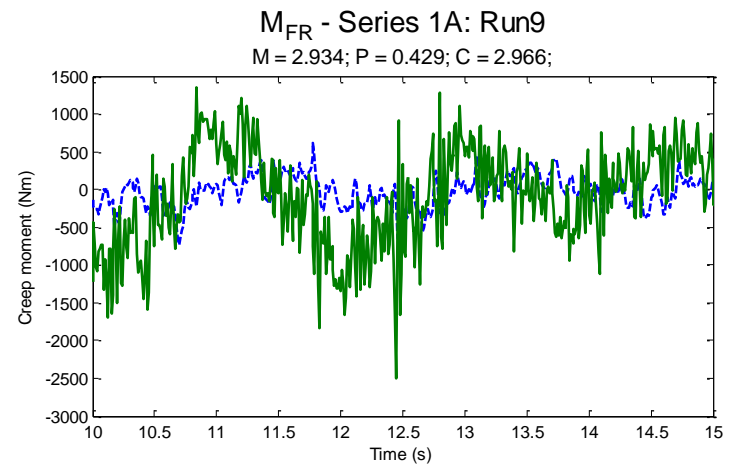
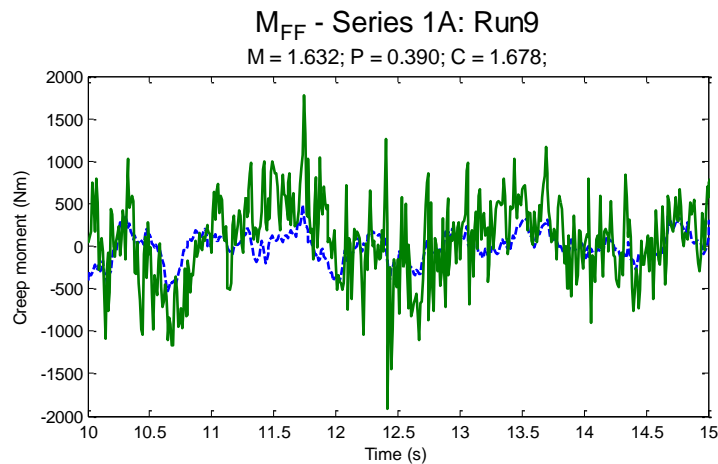
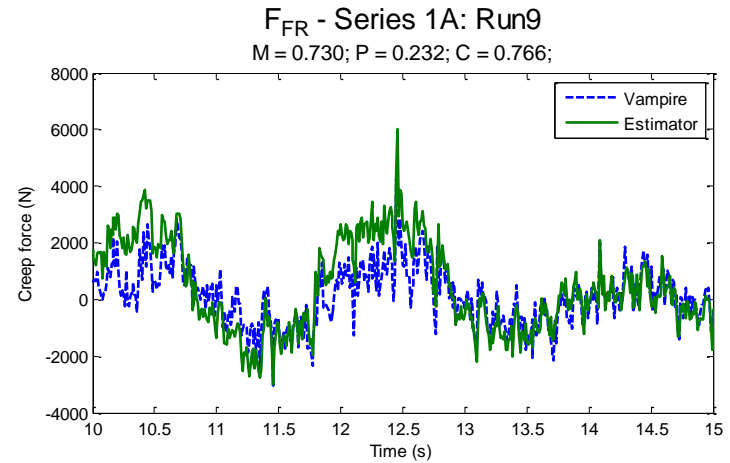
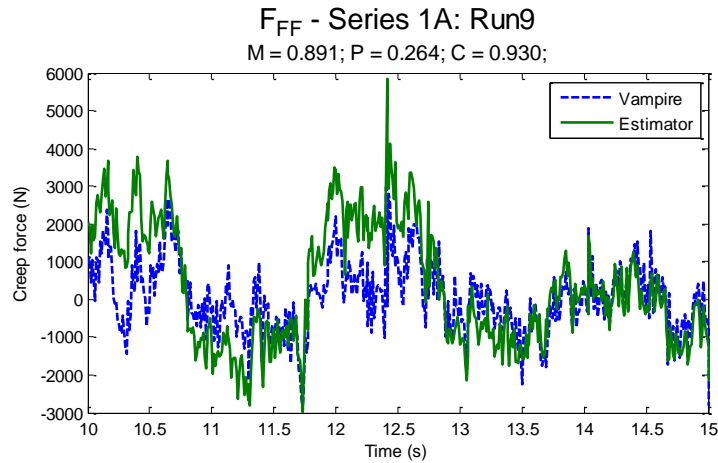
Methodology

- Linear Plan-view model
- Form Kalman-Bucy filter
- Estimate Contact Forces
 - (augmented states)
- Use relationships with dynamics to approximate adhesion





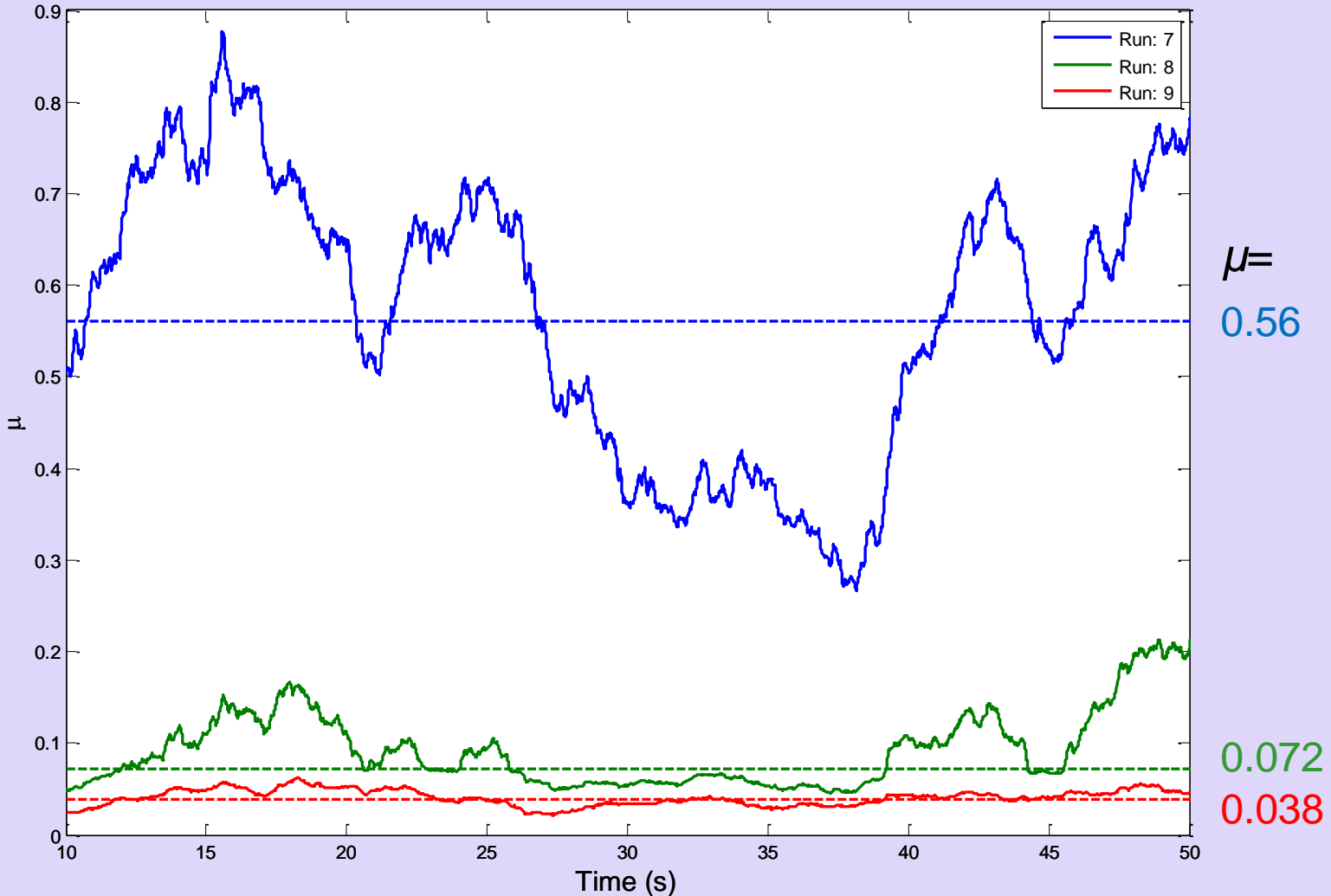
Results – Comparison to ‘real’ VAMPIRE data





Results – Comparison to ‘real’ VAMPIRE data

Adhesion Estimation - Series 1A Datasets
RMS window: 5s





Conclusions

- Reasonable approximation of adhesion estimation
 - Direct data methods showing good results too
- Success against 'Blind Data'
- Progression to track testing – June 2013?