Soil-pipeline interaction on slopes under earthquake loading

Exchange-Risk Workshop

Resilience of natural gas pipeline networks to natural hazards

Bristol, 1 September 2016

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OUTLINE

- Background
- Developed computational model
- Special features
- Application
- Representative results
- Developed model vs typical models used in practice
- Typical results
- Effect of special features of developed model
- Conclusions

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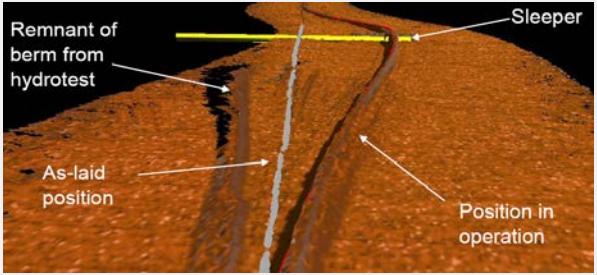

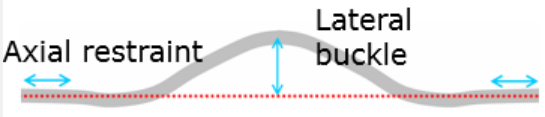

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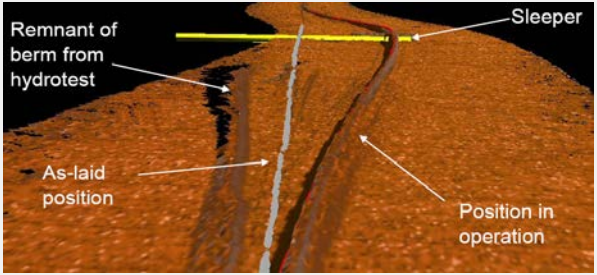

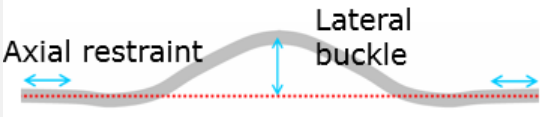

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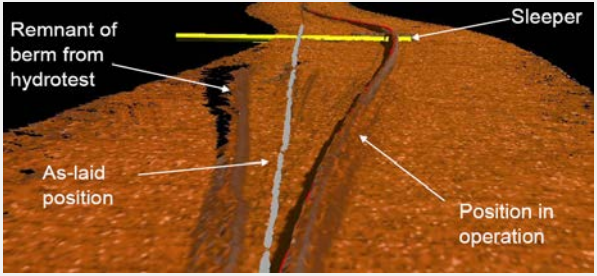

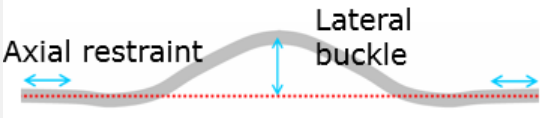

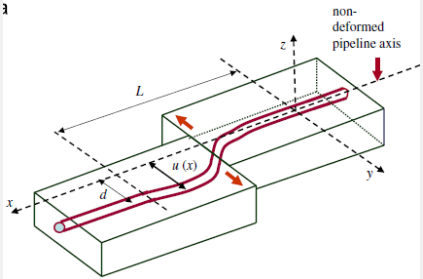

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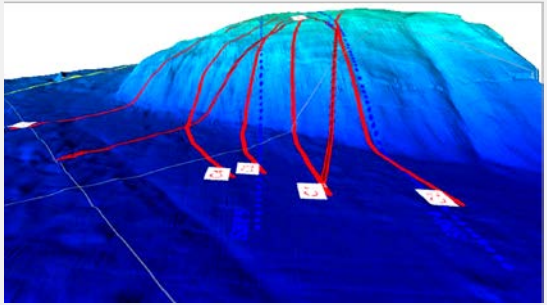

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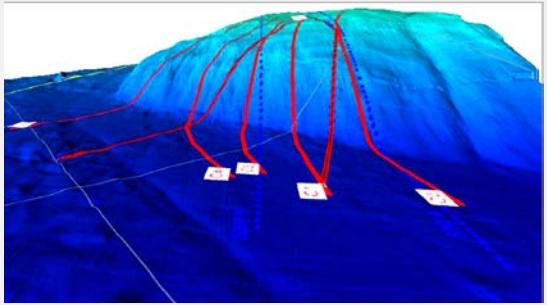
- Common cases are pipelines traversing submarine slopes which tend to experience large downslope displacements due to earthquakes.



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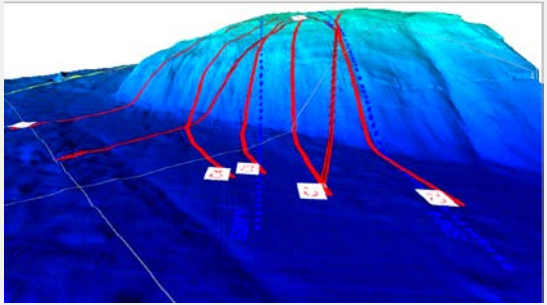

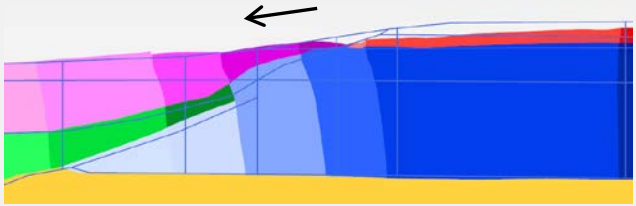

Downslope displacements due to earthquake

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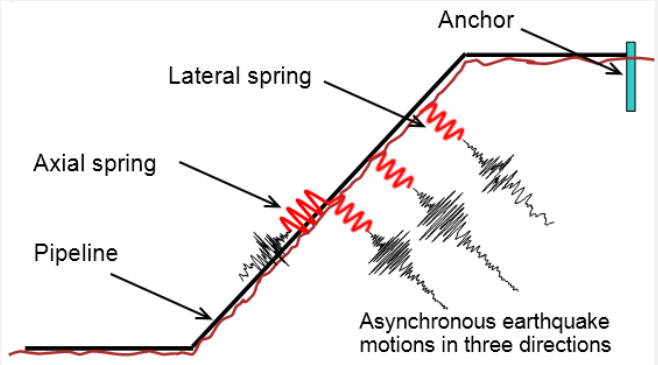

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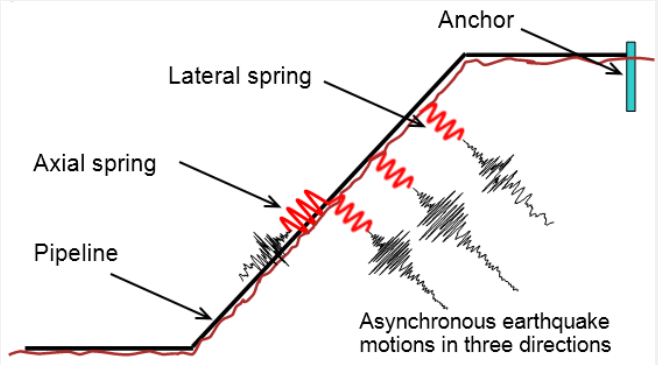

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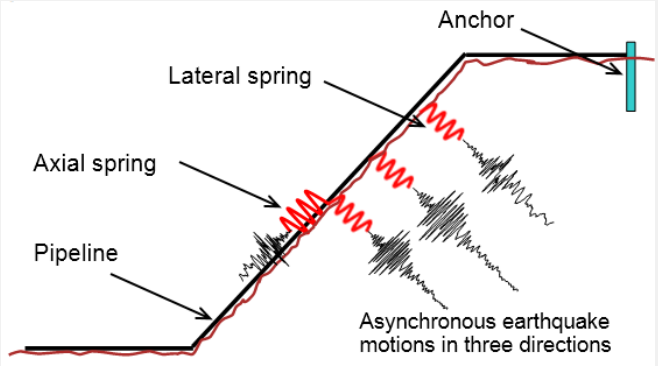

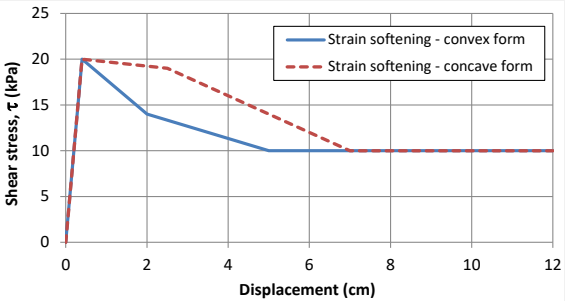

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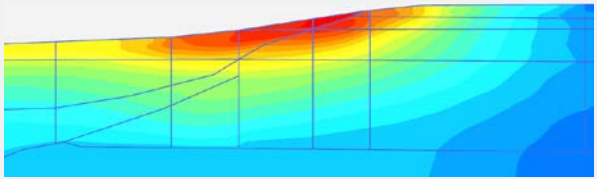

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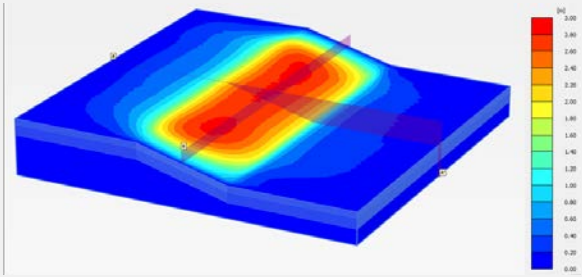

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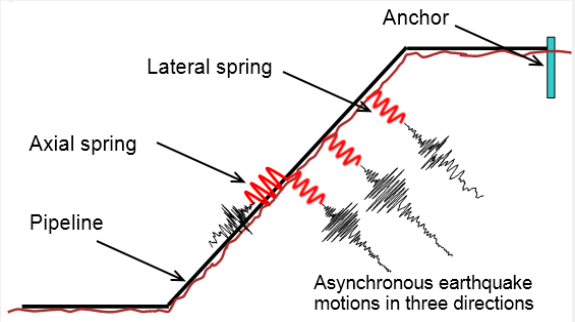

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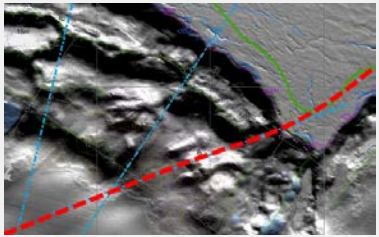

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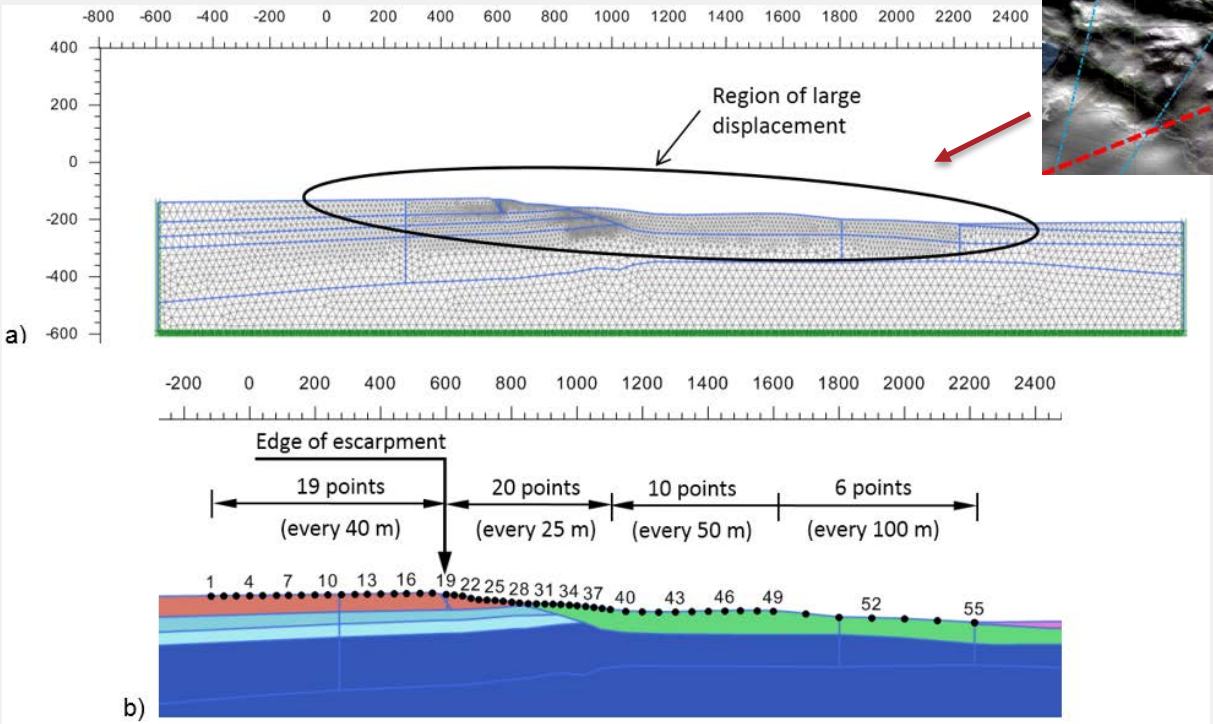

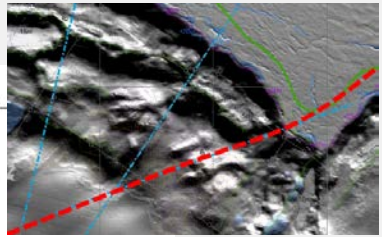

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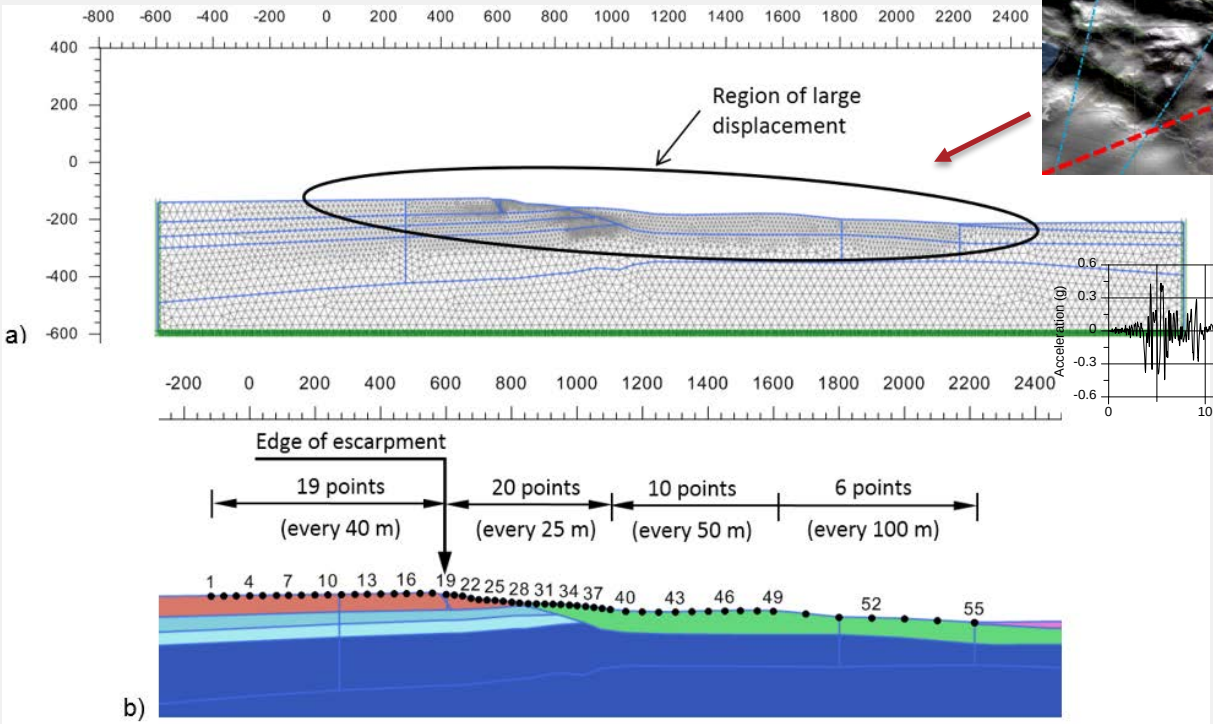

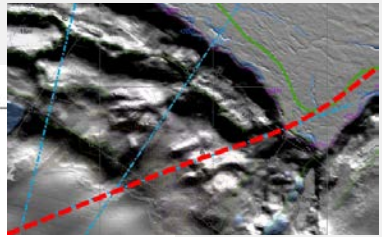

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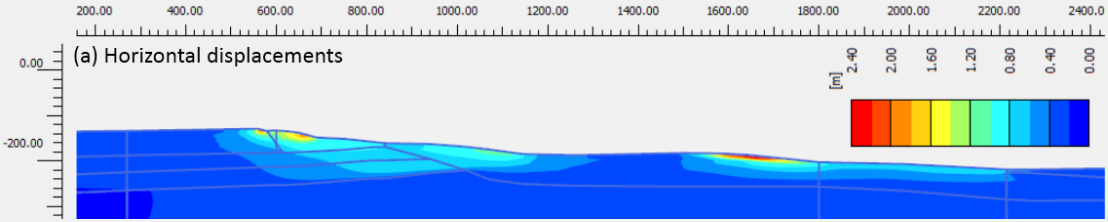

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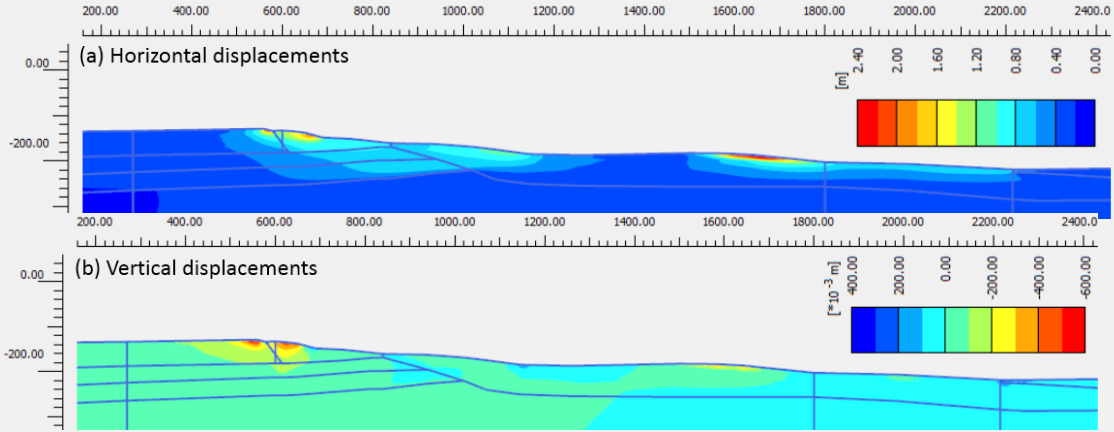

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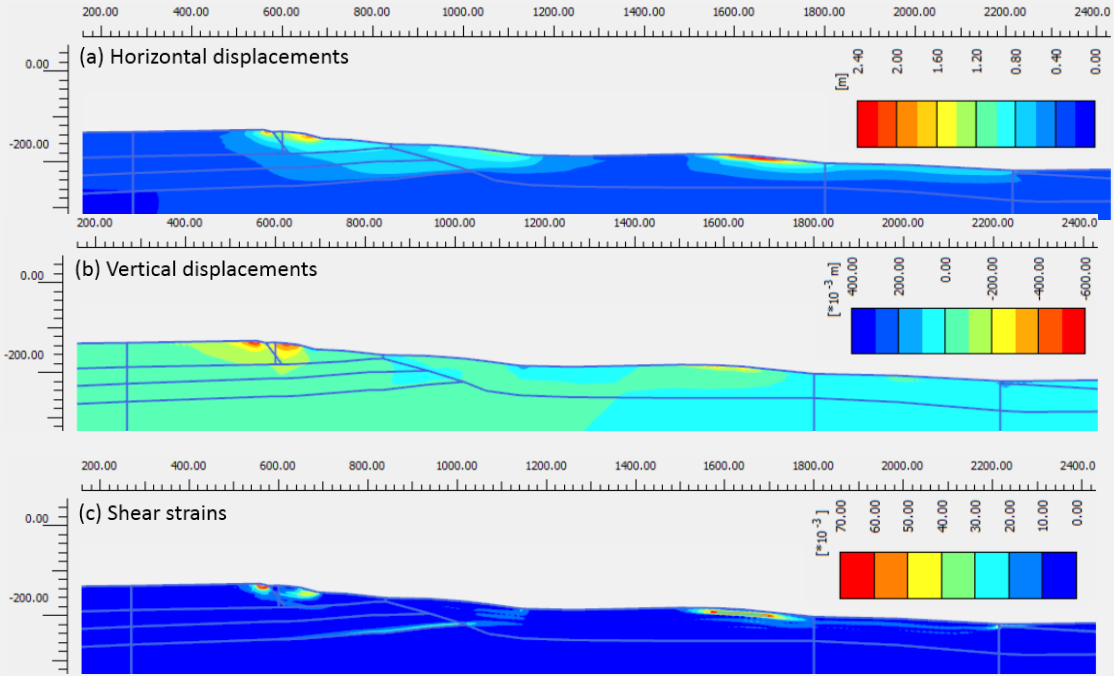

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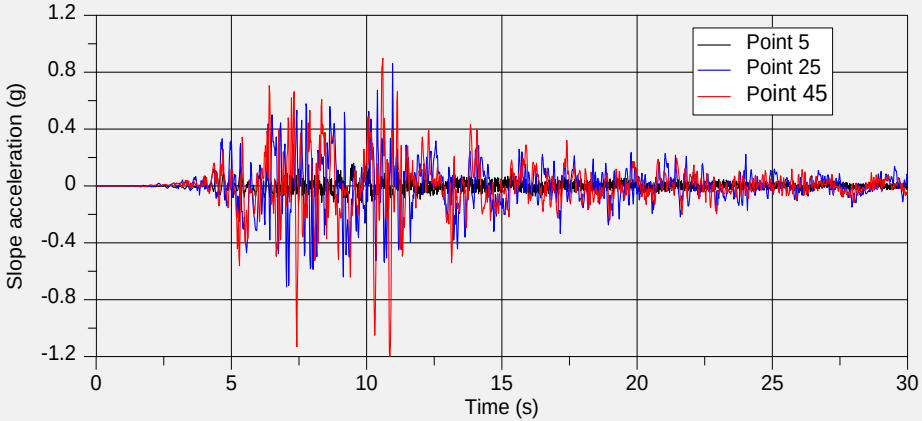

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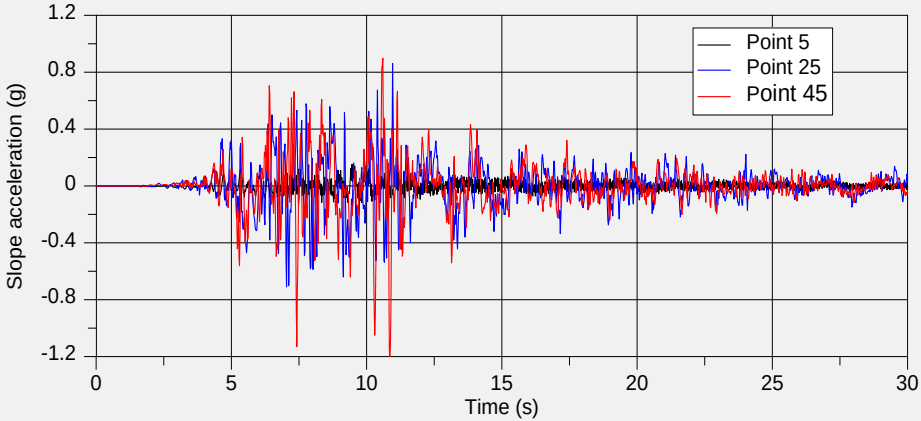

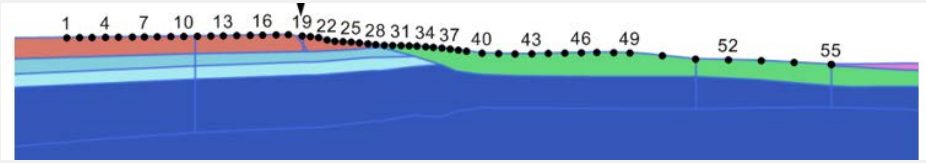

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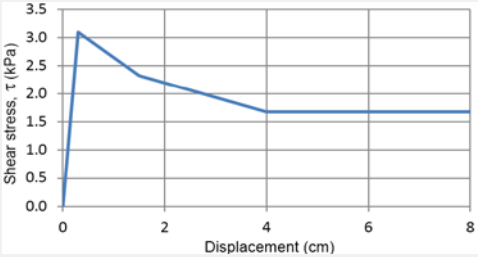

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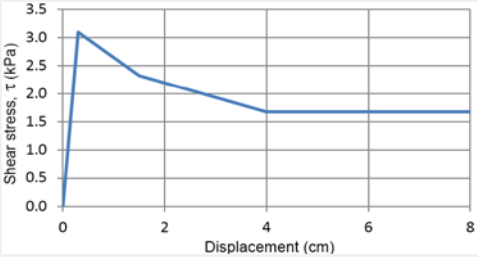

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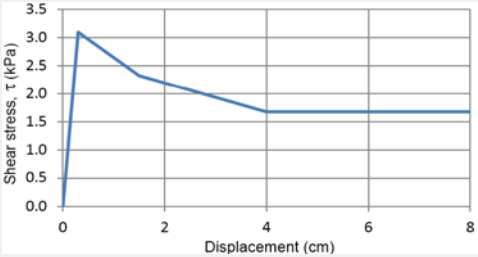

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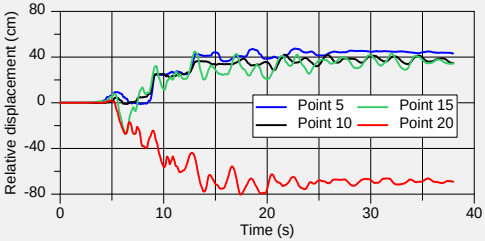

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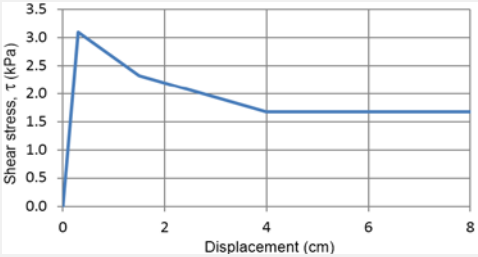

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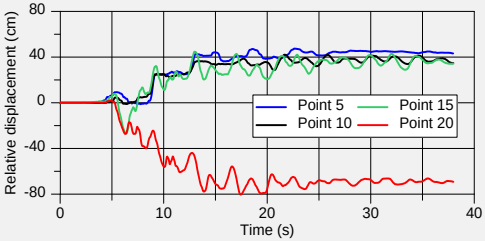

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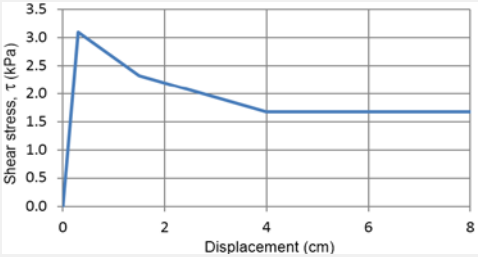

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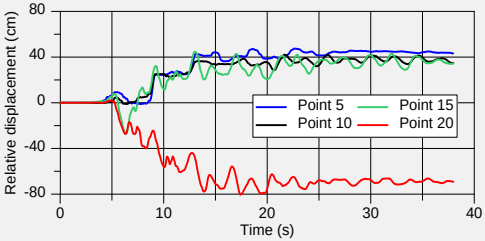

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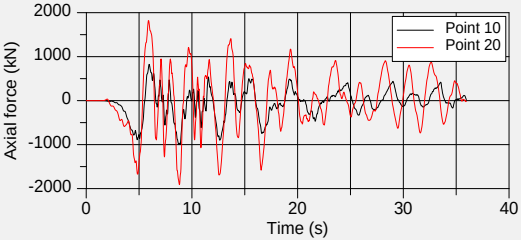

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Maximum axial forces and bending moments in pipeline

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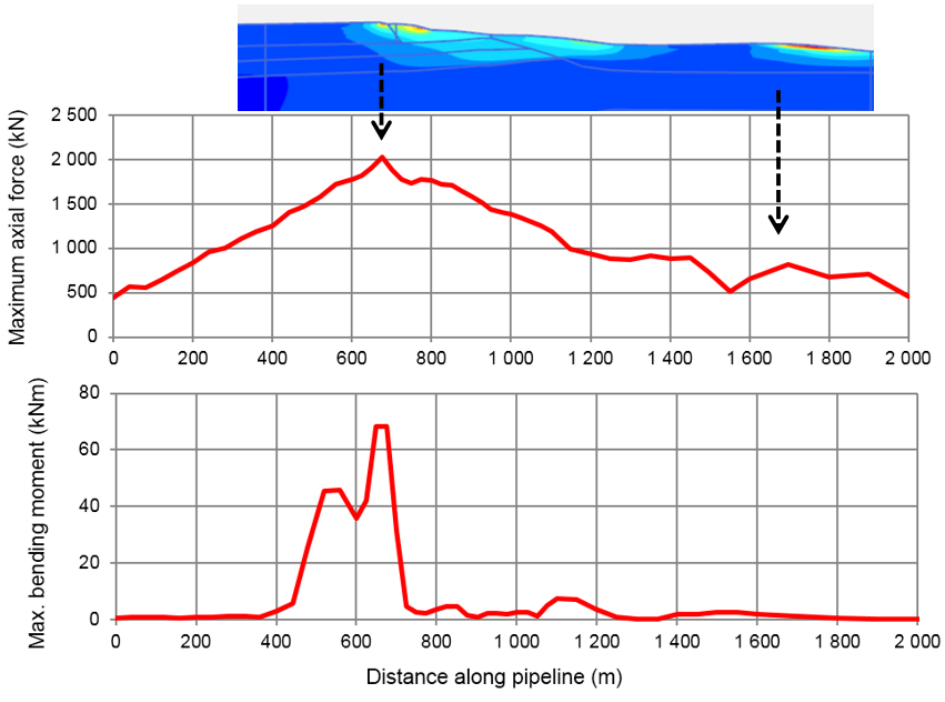

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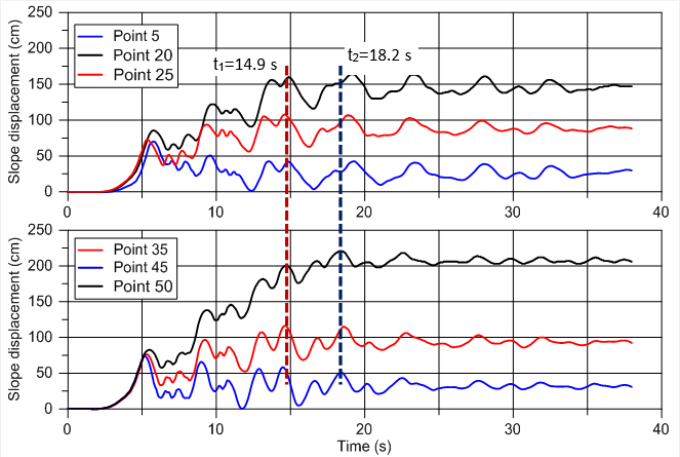

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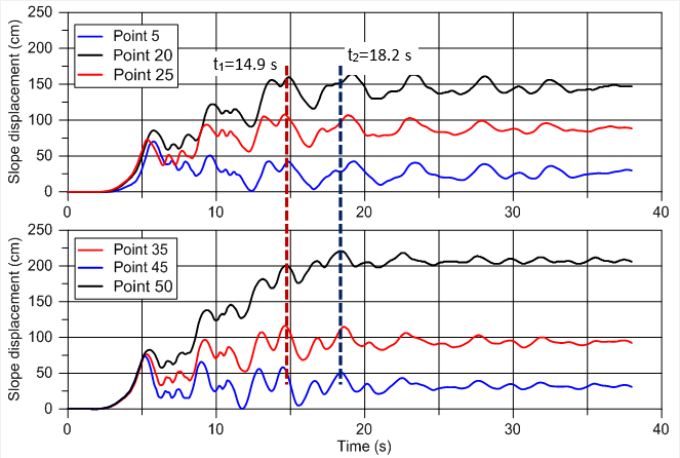

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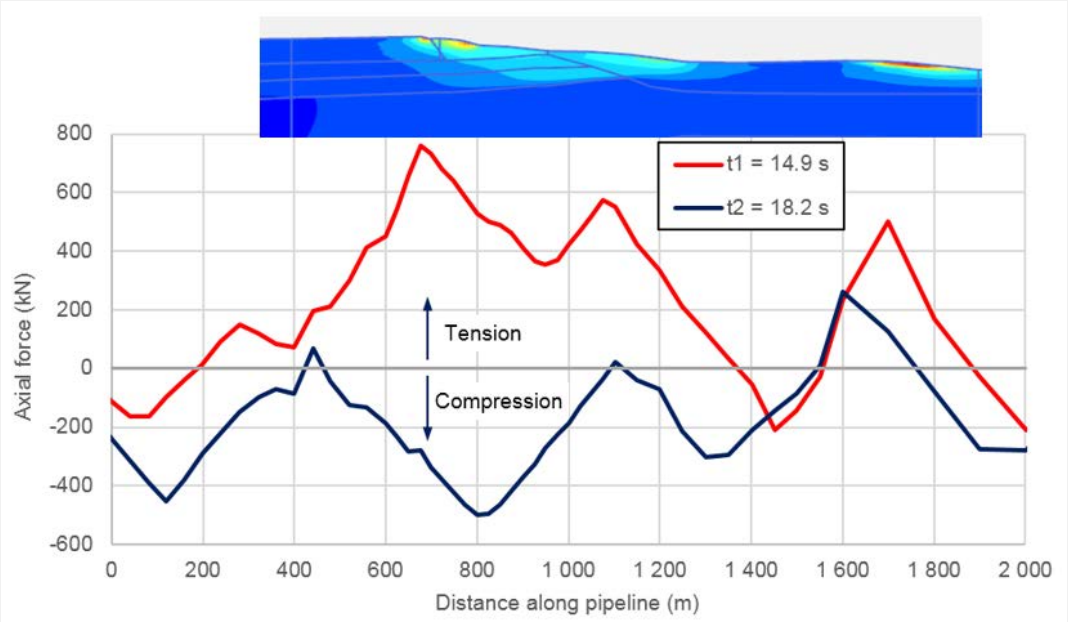

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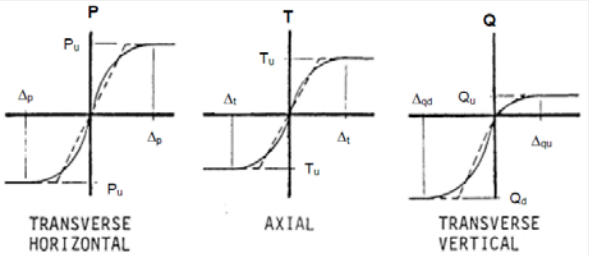

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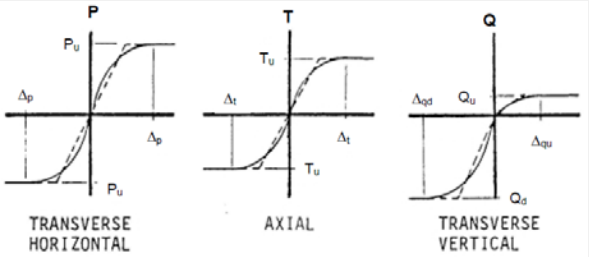
- Comparison of computed forces with and without strain softening springs.



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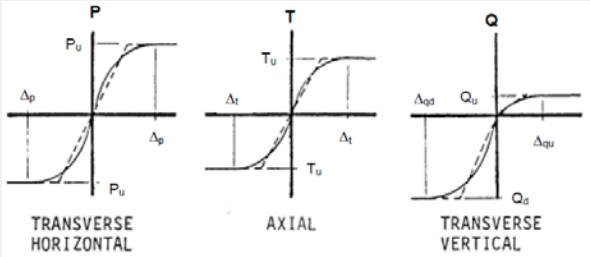
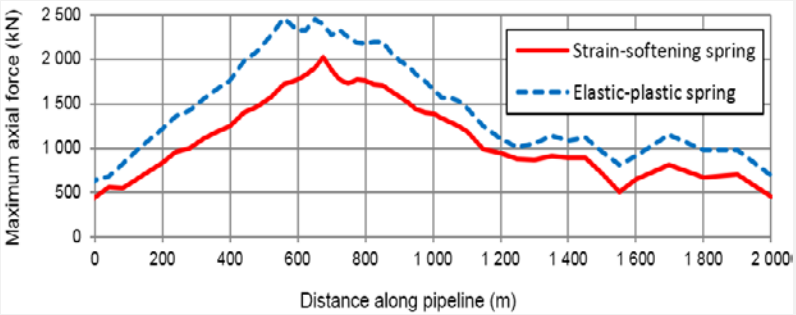


- Comparison of computed forces with and without strain softening springs.



Effect of Strain Softening

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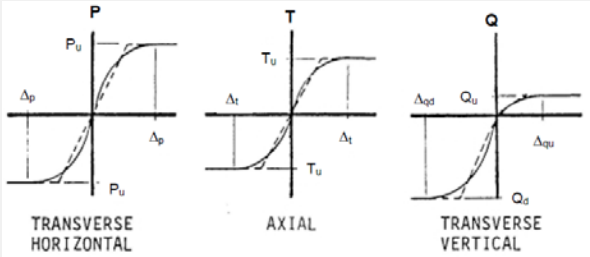
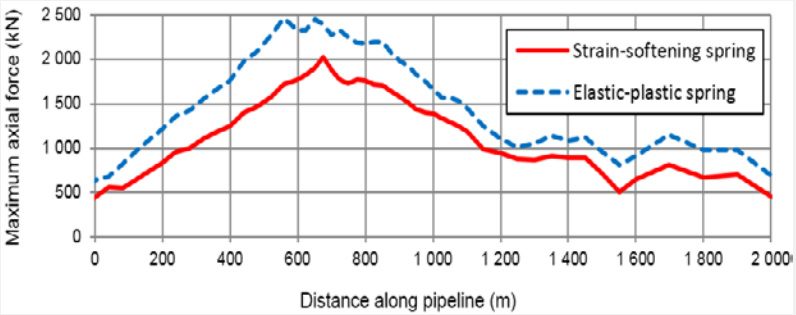


- Comparison of computed forces with and without strain softening springs.

- Strain softening helps reduce forces in pipeline; positive feature in design.



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- Common analysis methods based on pseudo-static method are not conservative.

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Thank you for your attention