

Discrete Element Modelling of Asphalt Mixtures

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Introduction

- The aim of this project is to use Discrete Element Modeling to investigate the deformation behavior of asphalt mixtures from a micro mechanical perspective.
- In Figure 1 the coloured particles represent the graded aggregate; the light blue colour represents the bitumen. The top and bottom walls represent the loading platens. The Burger's model was used to represent the time-dependent behavior of the bitumen.
- Lab samples with the same mixture design as in the simulations were produced. Uniaxial compressive strain control tests were undertaken in the laboratory. The comparison between the simulations and laboratory results for constant strain rate tests are shown below (Fig.2).

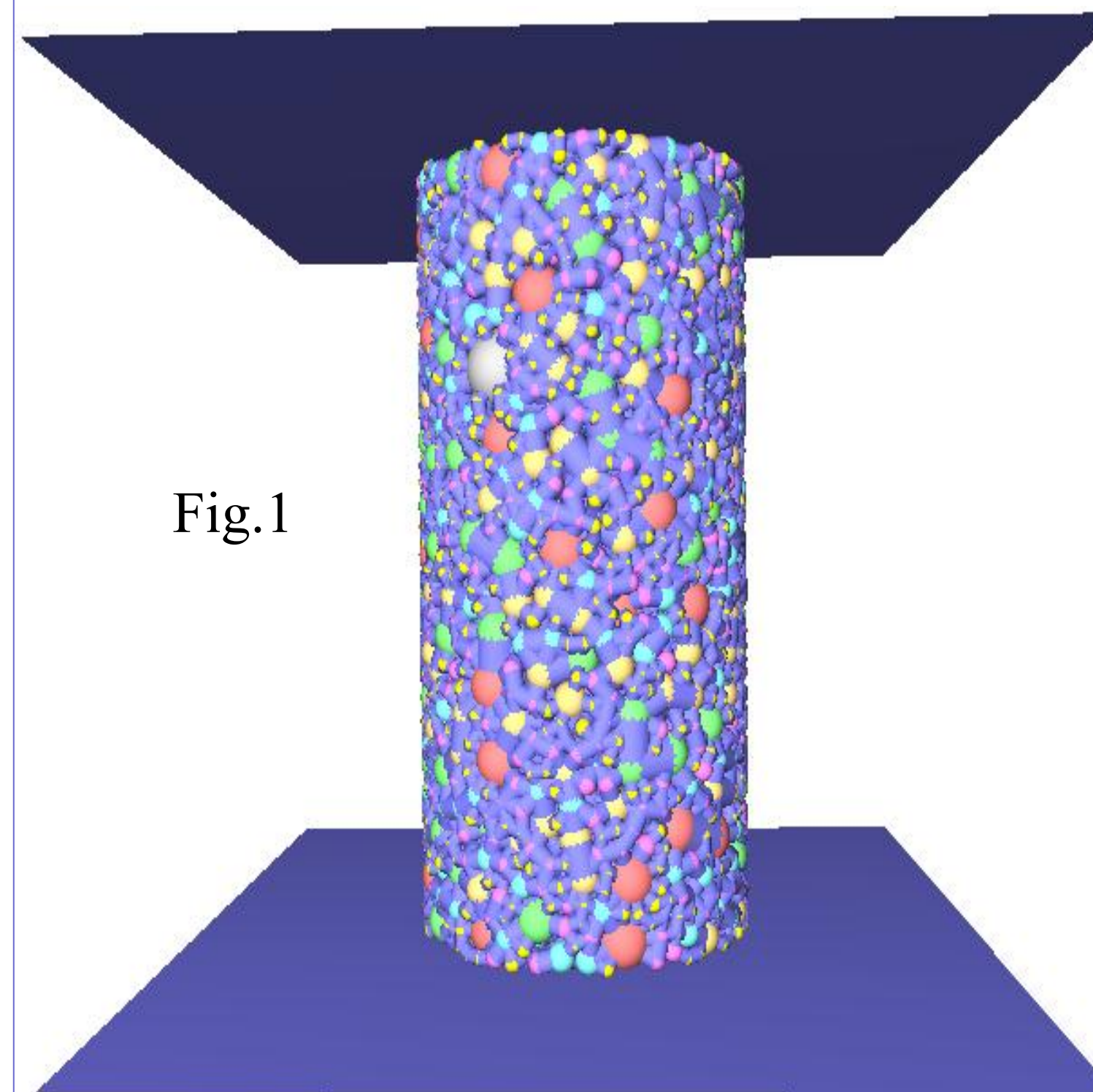


Fig.1

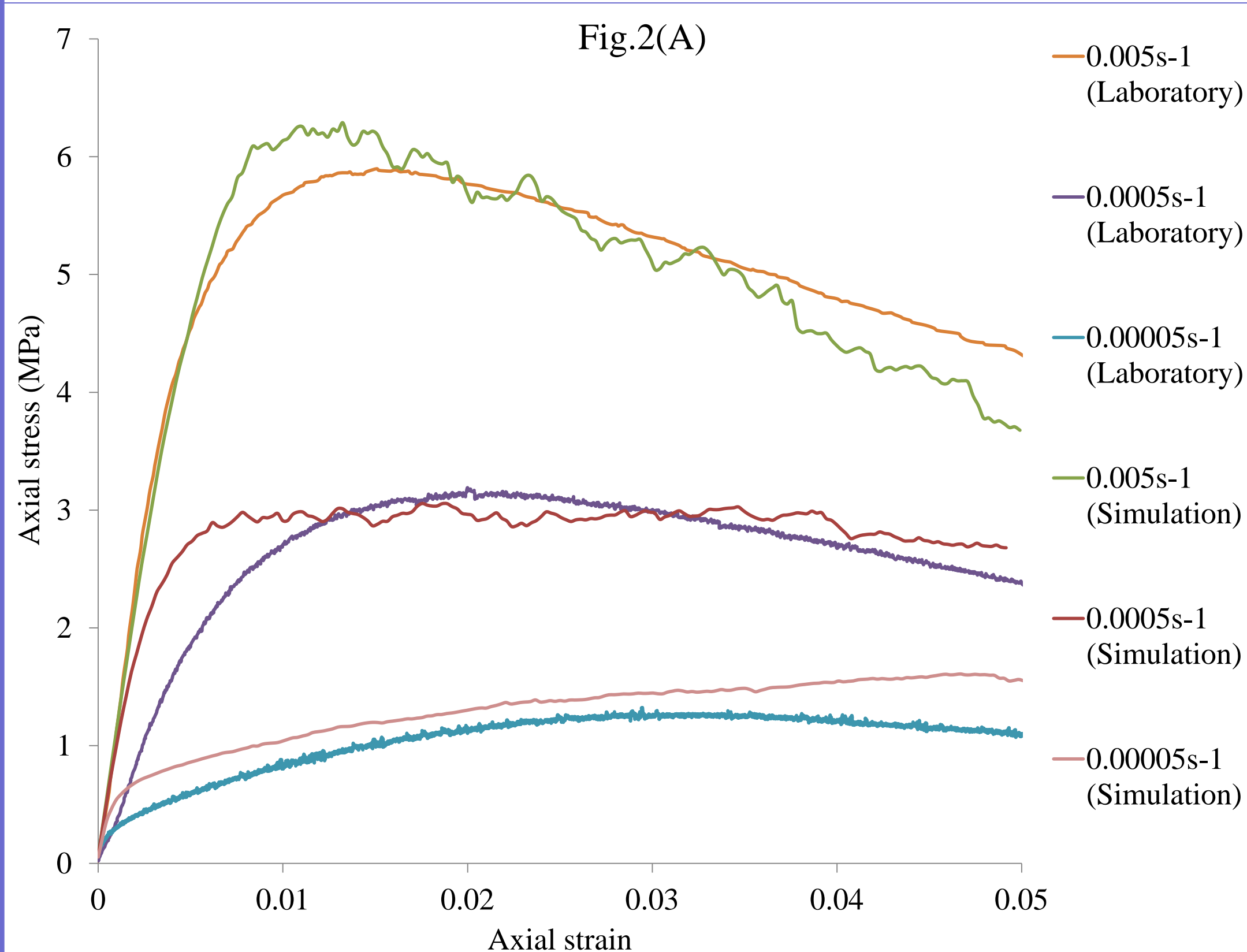


Fig.2(A)

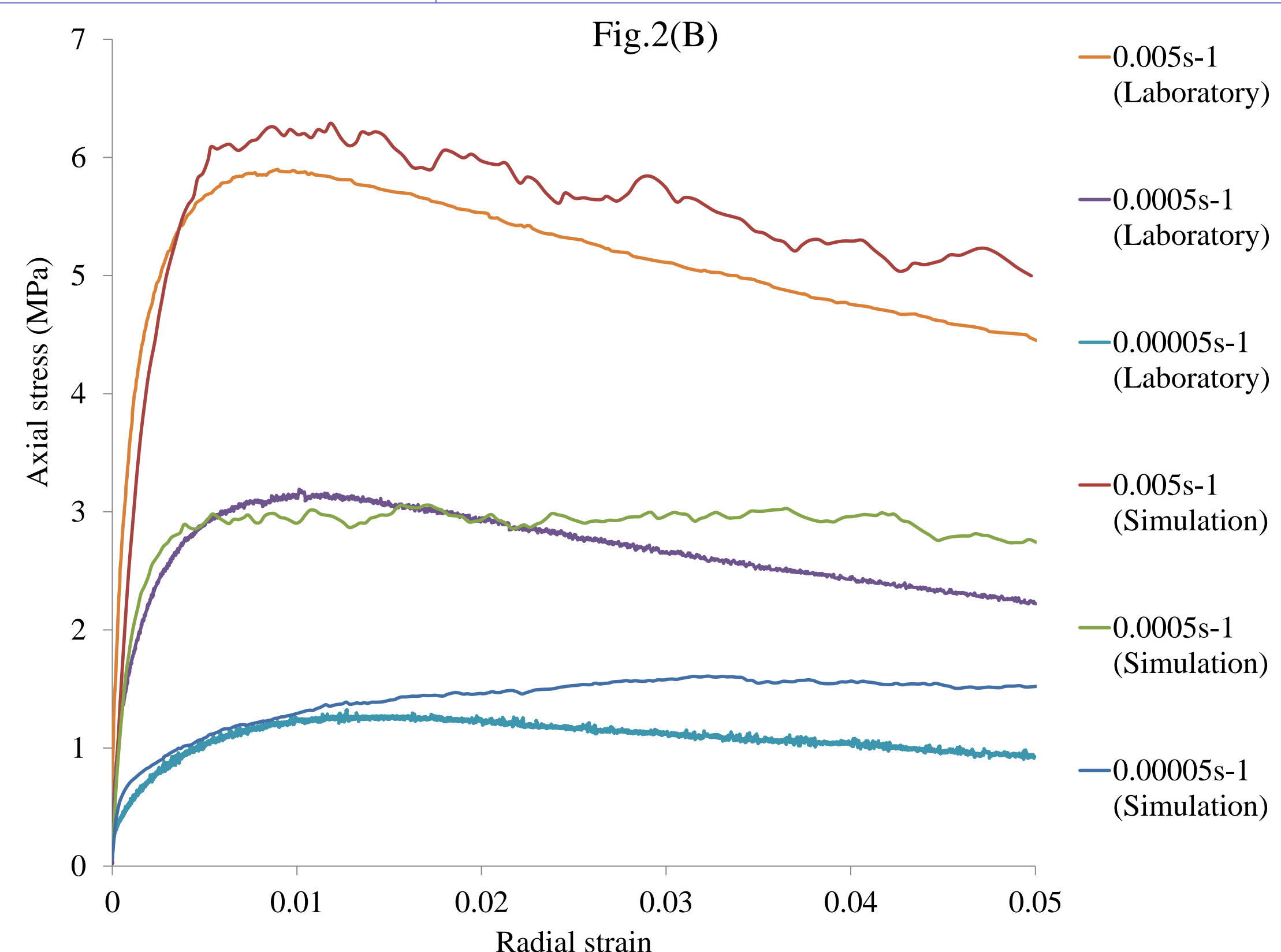


Fig.2(B)

Conclusion

- A numerical sample preparation procedure has been developed
- Discrete element modeling can be used to simulate the behavior of asphalt mixture under uniaxial compression tests
- The Burger's model can be used to represent the time dependent behavior of bitumen
- The simulation results have been compared with experimental data and demonstrated the ability of this type of approach