

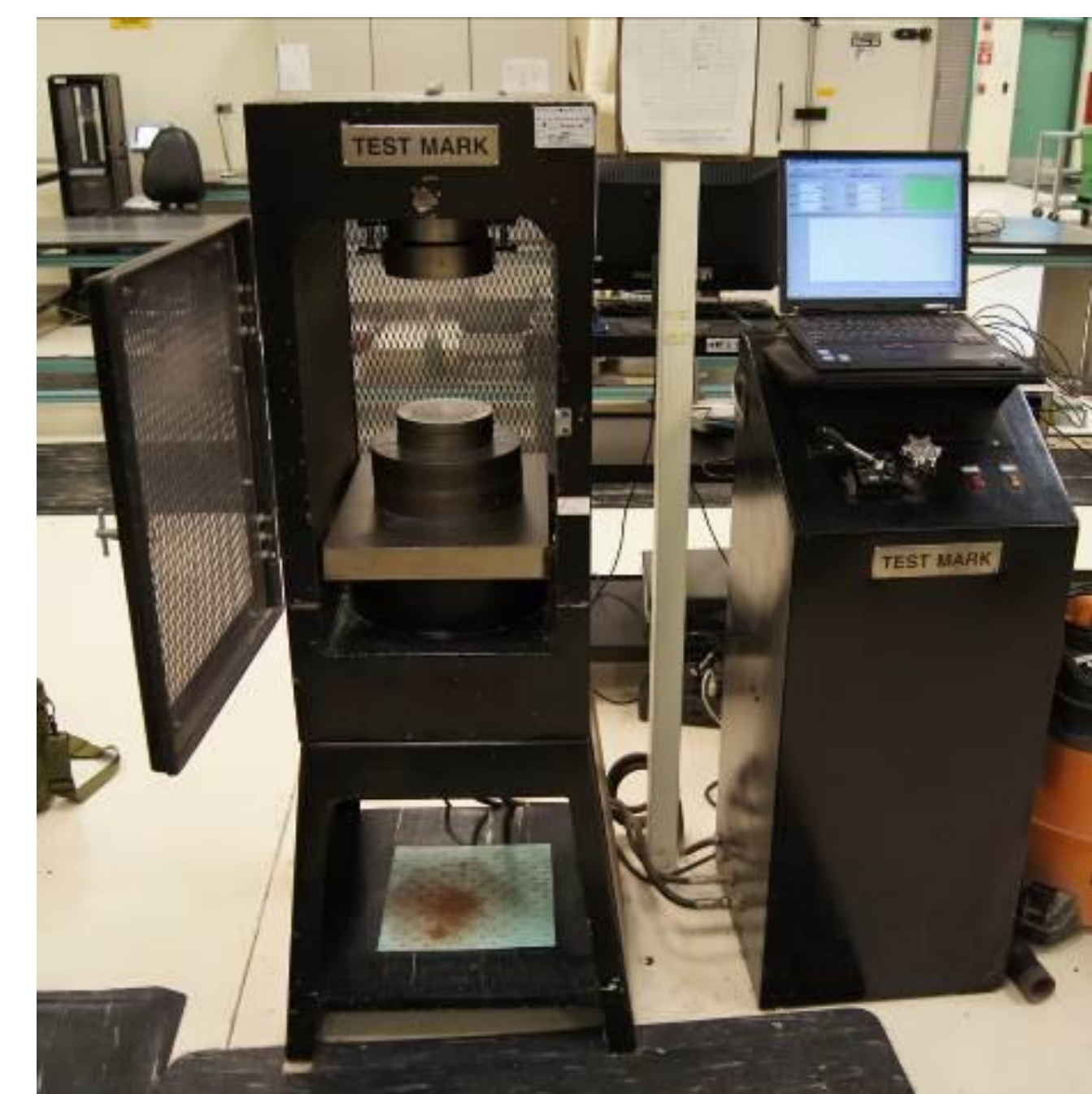
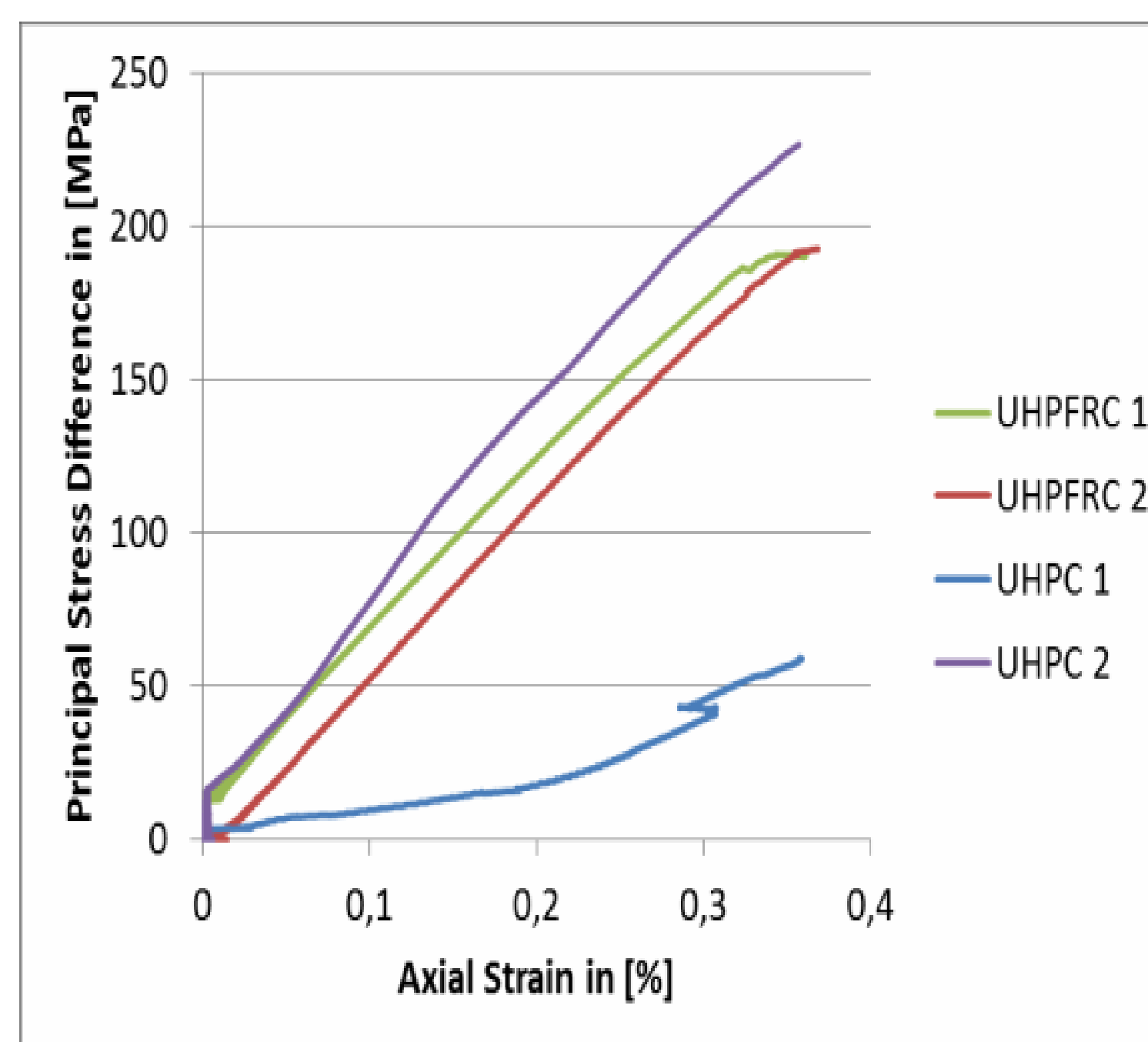
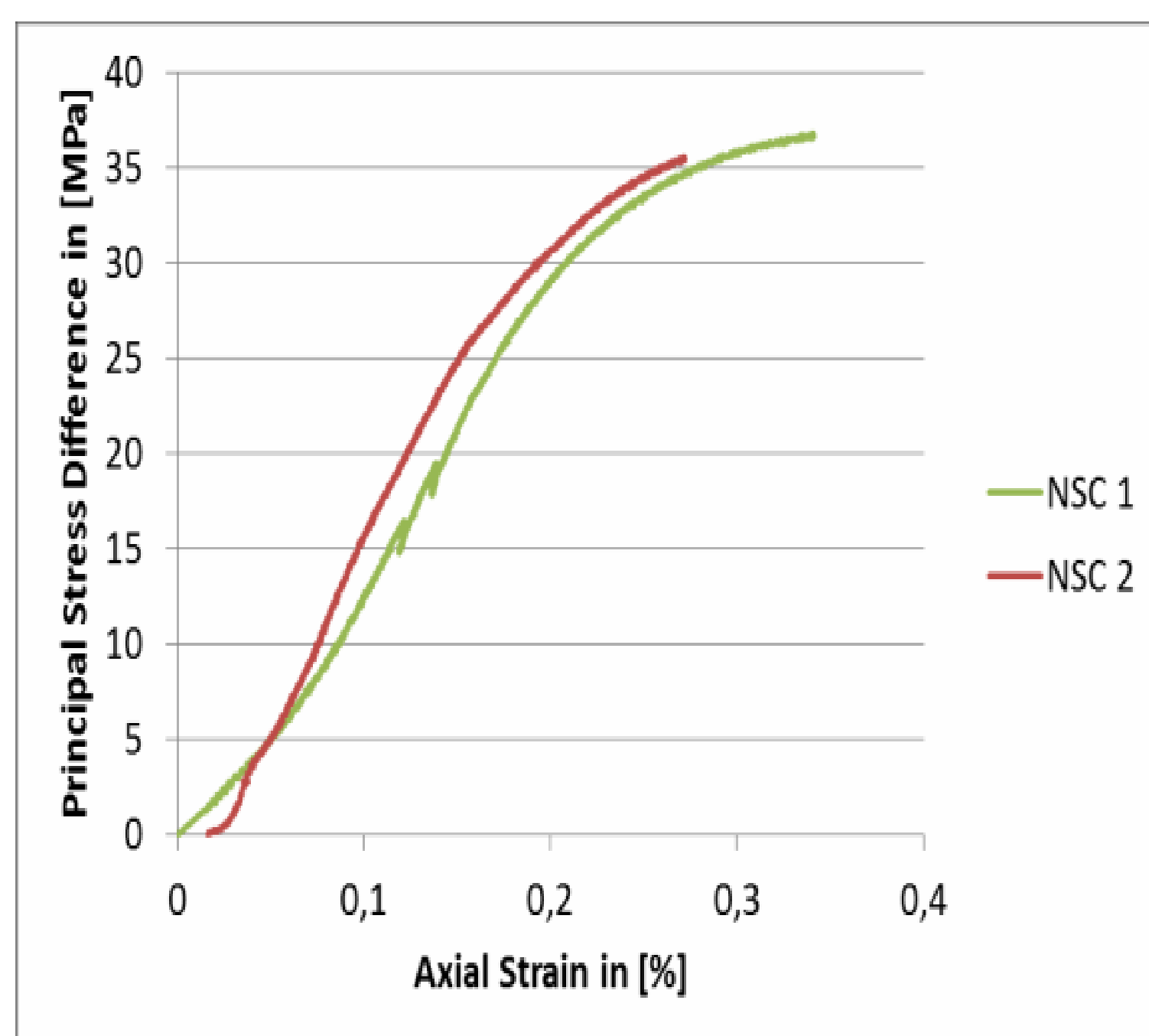
Normal Strength and Ultra-High Performance Concrete Cylinders Under Static and Impact Loading

Introduction and Objectives

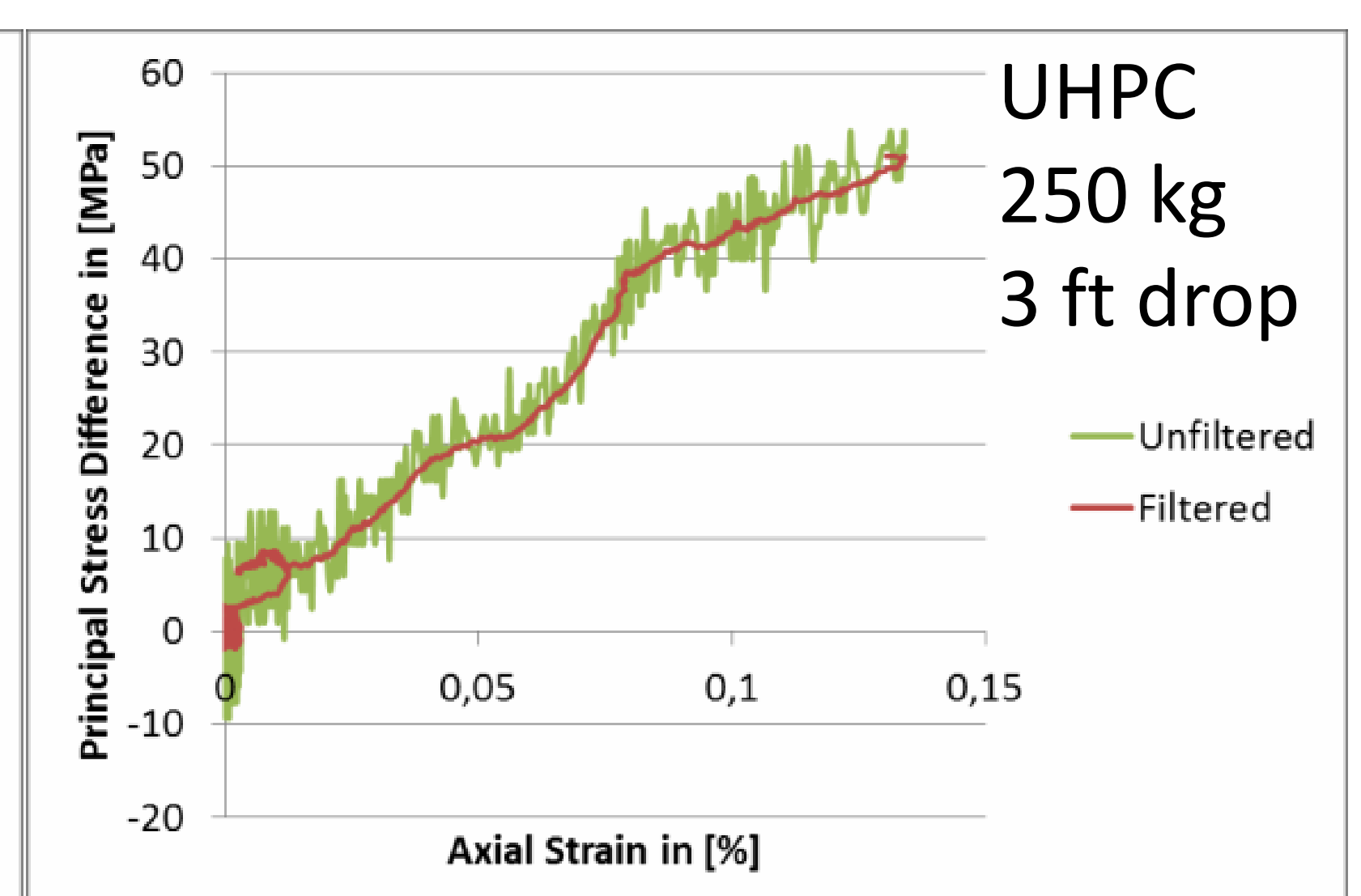
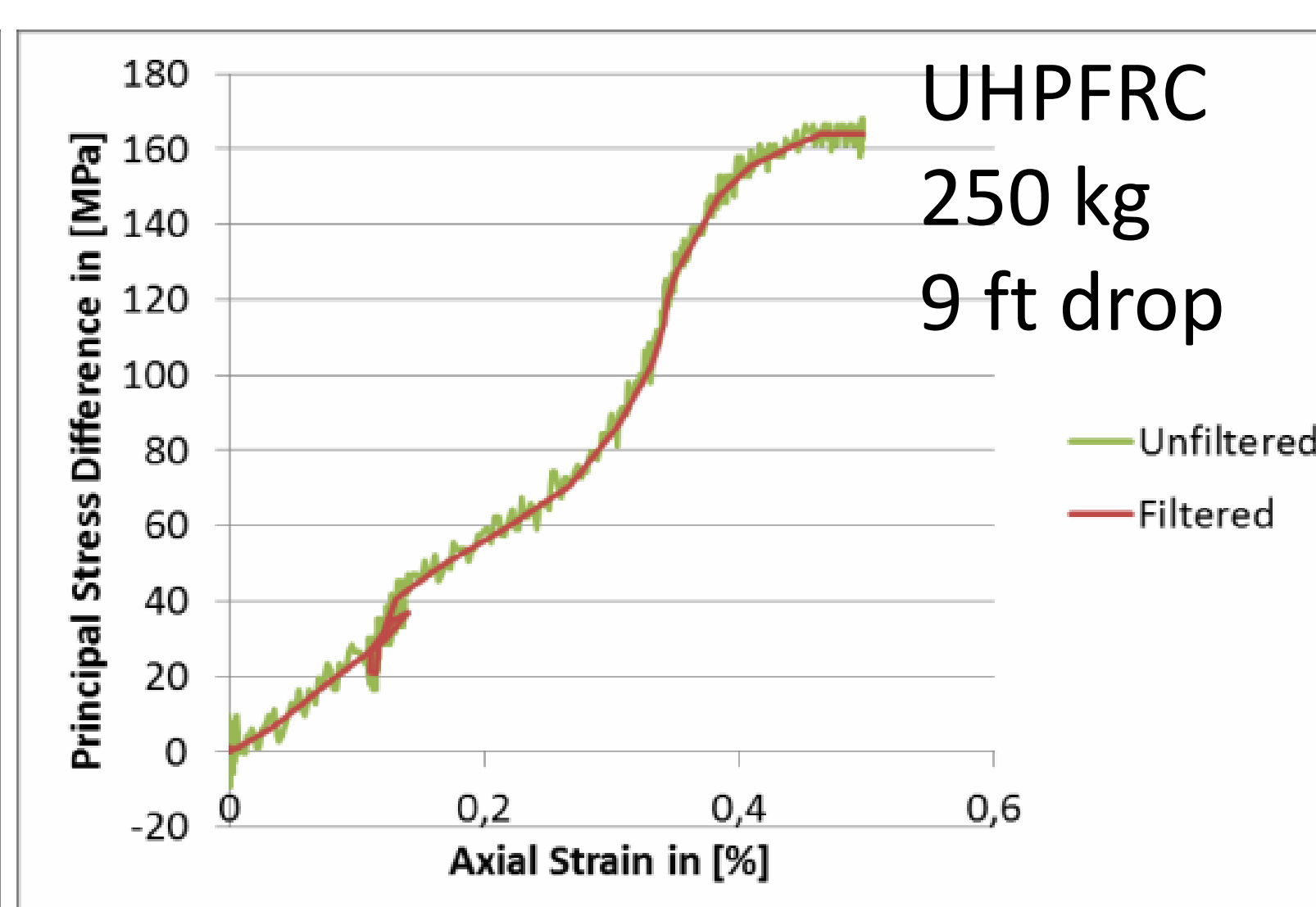
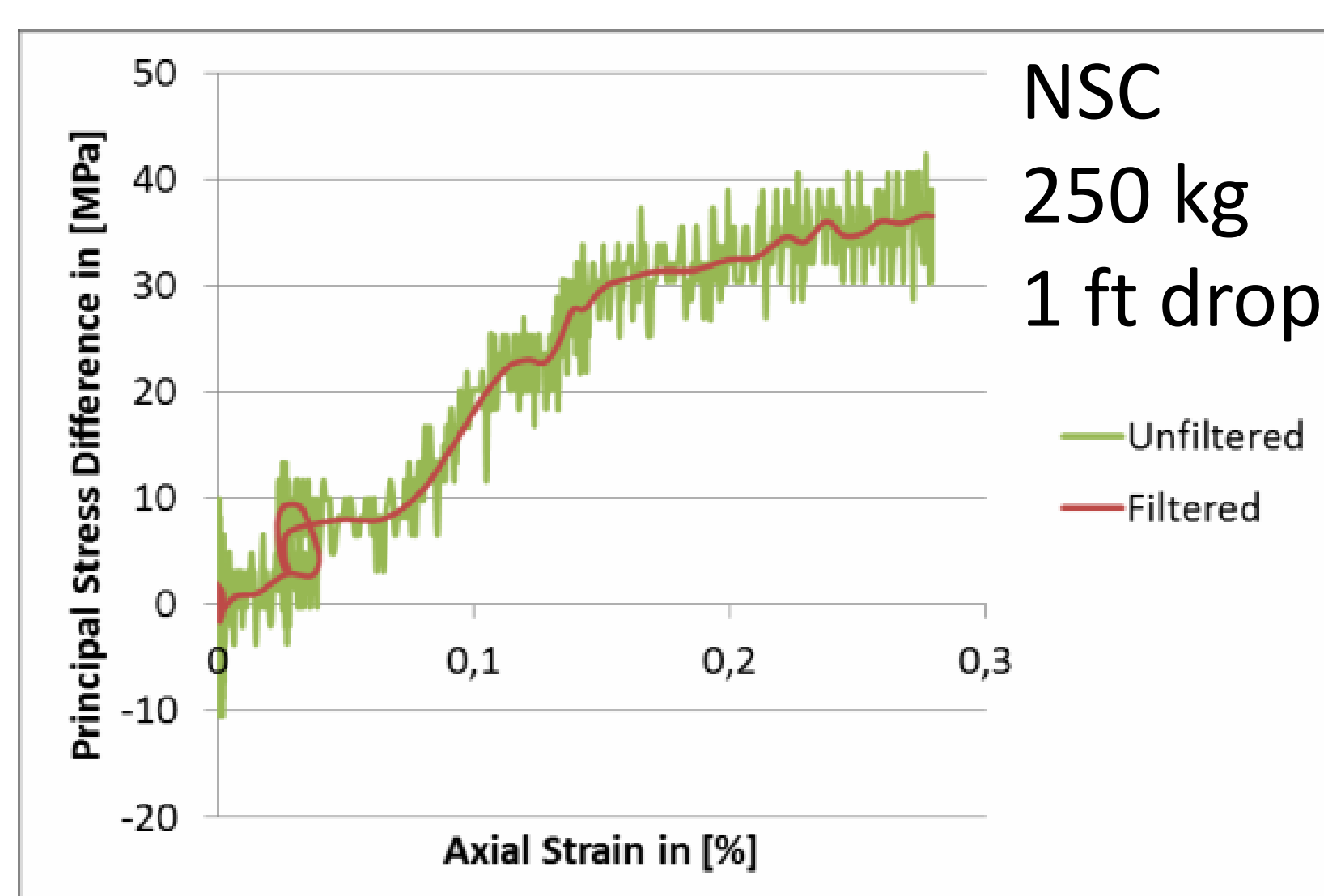
The focus of this study was to characterize the material properties of test cylinders made of normal strength concrete (NSC), and ultra-high performance concrete with and without steel fibers (UHPC or UHPFRC, respectively) under both static and impact loading. 100 mm x 200 mm and 150 mm x 300 mm UHPC and NSC cylinders were statically and dynamically tested, and their behaviors were simulated with the finite element program Abaqus/Explicit to define the Concrete Damaged Plasticity (CDP) model, accordingly.

Research Approach

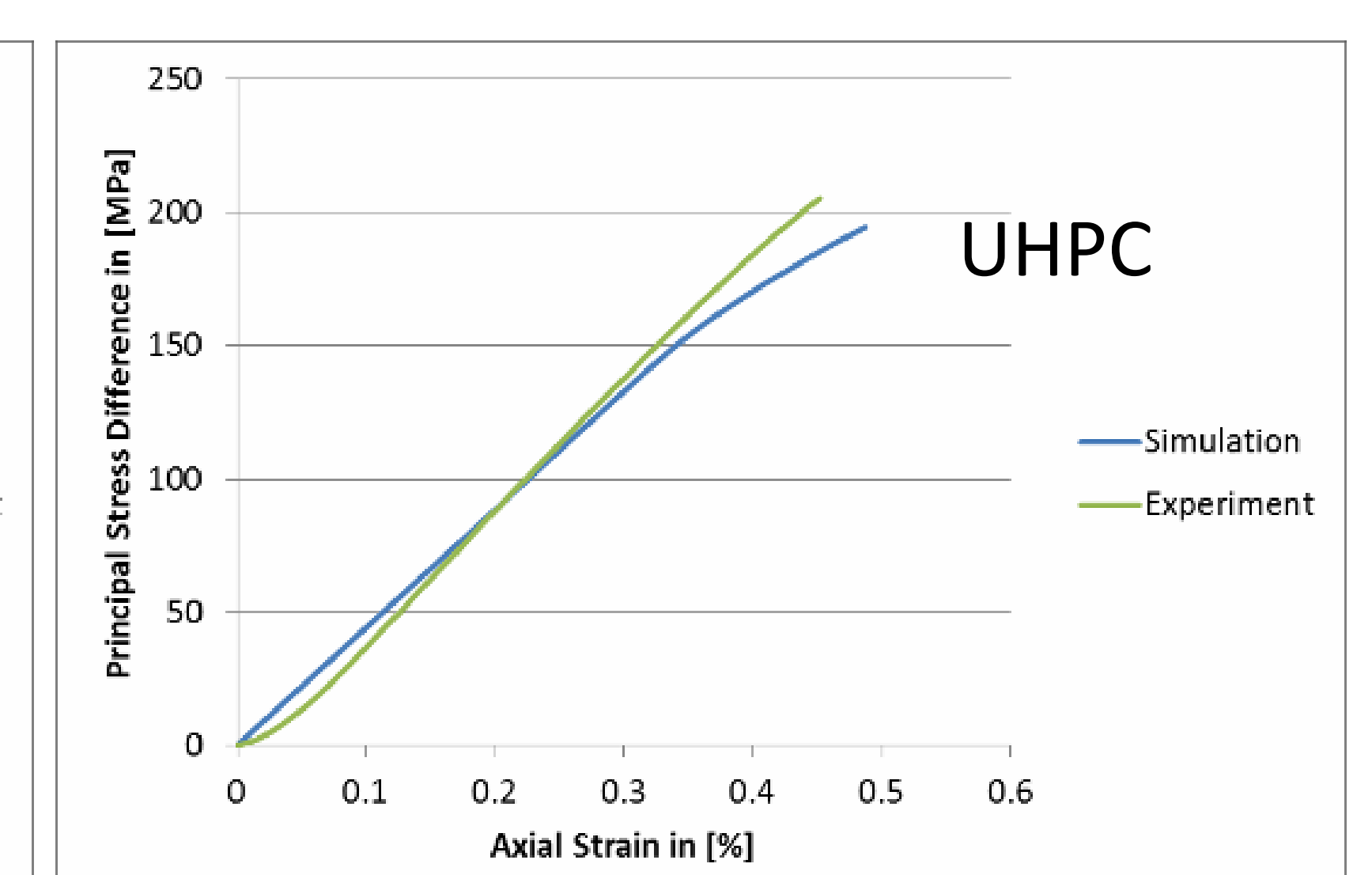
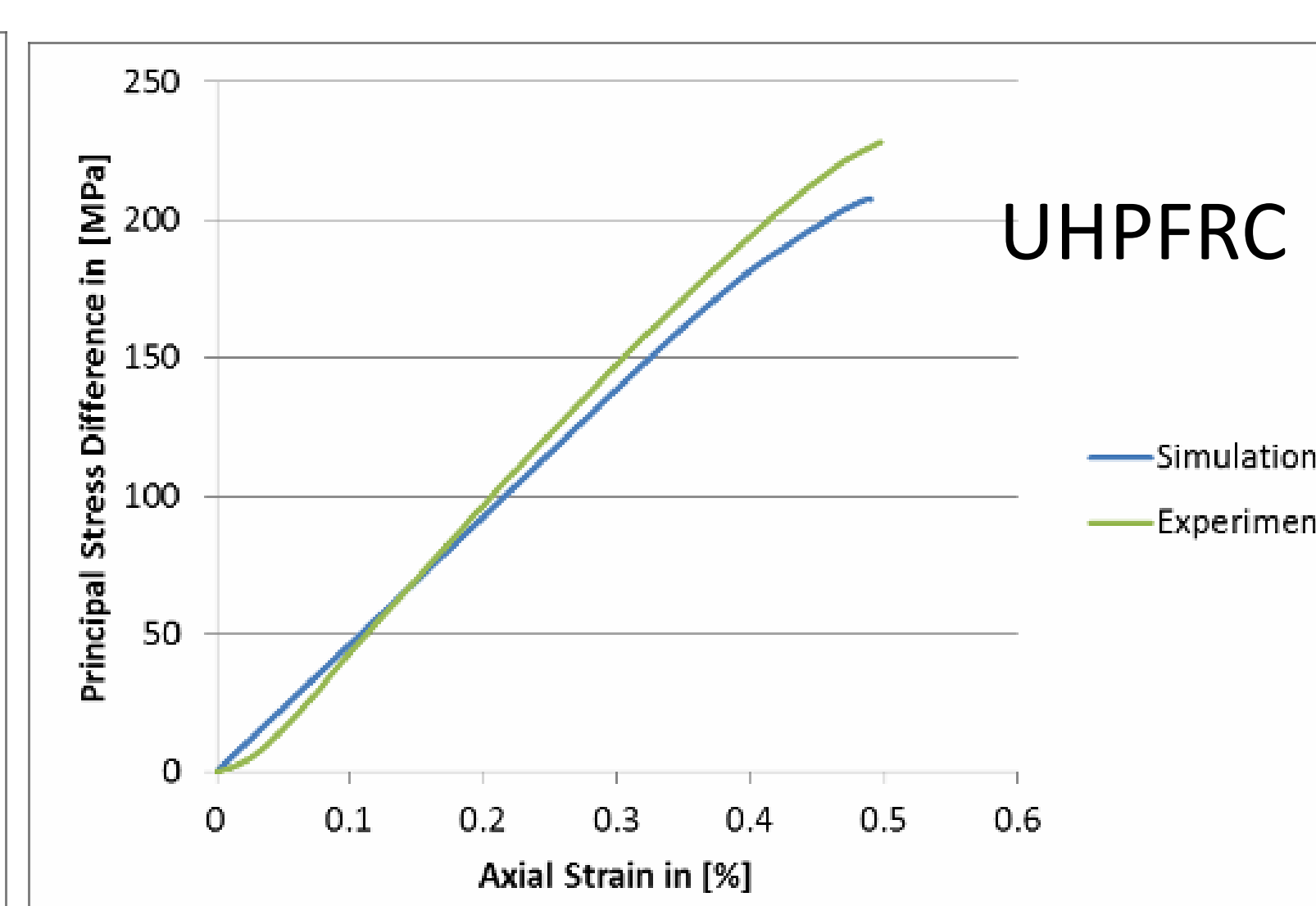
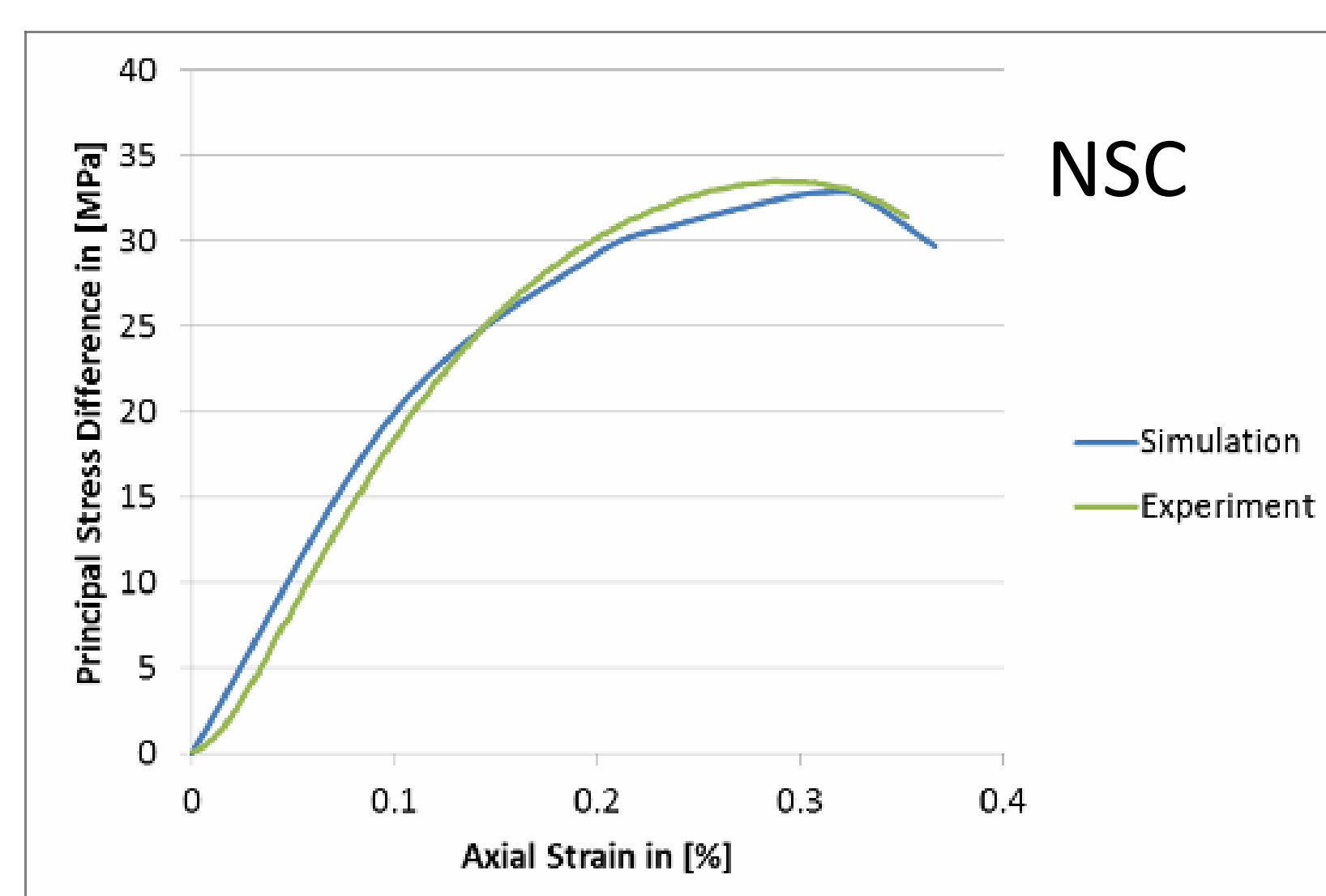
- Pre-test simulations with ABAQUS/Explicit
- Static tests
- Precision impact tests with 250 kg drop hammer
- Post-test analysis and application to ABAQUS/Explicit



Results from static uniaxial compression tests



Results from impact uniaxial compression tests



Comparisons of simulation and test results - Static

Conclusions

- UHPC greatly increased the cylinders' strength, as compared with NSC, and the fibers provide very significant additional enhancements of both strength and ductility
- The numerical simulations provided very close representations of test data