



Numerical Analysis of Structures in Fire Using OpenSees

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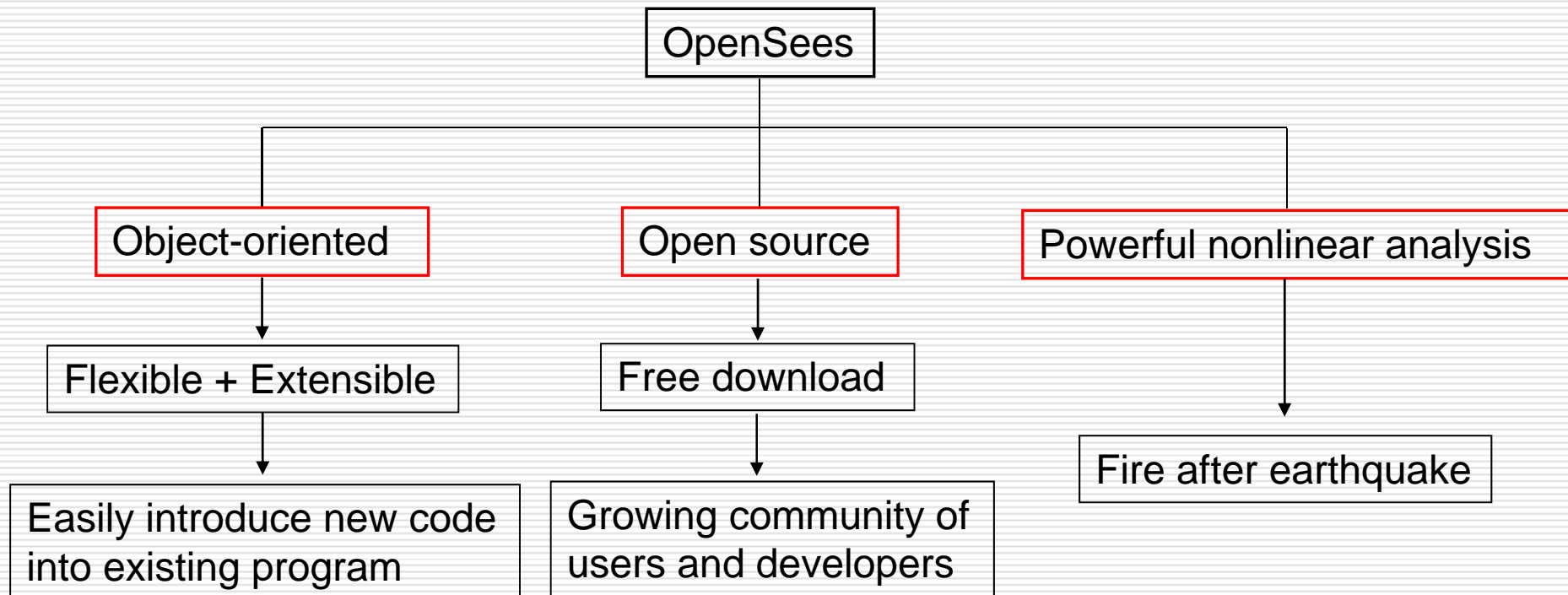
29 Apr 2011

Introduction

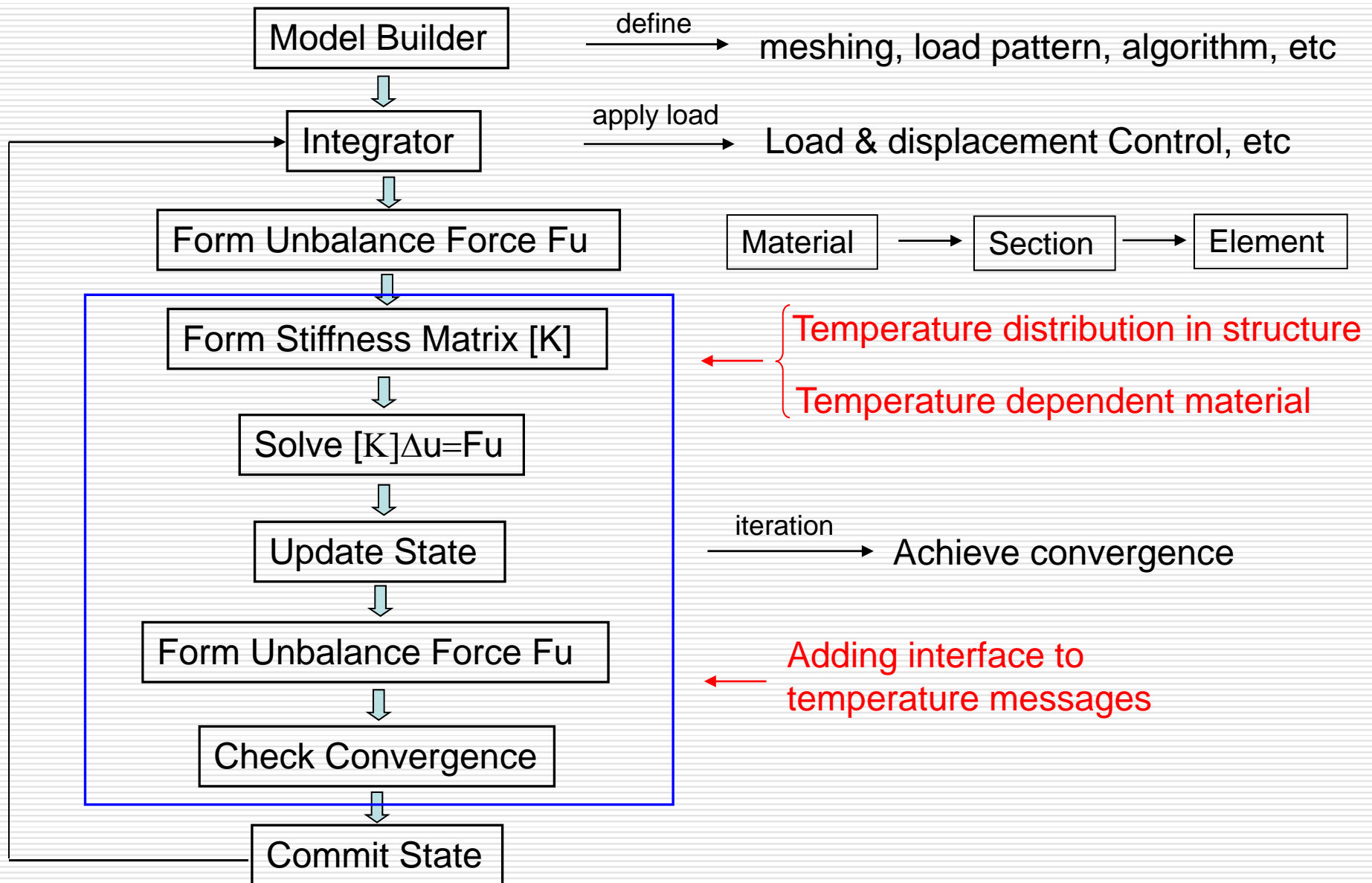
OpenSees

Why is OpenSees

developed by UC Berkeley and focussed on non-linear response of structural frames subjected to seismic excitations



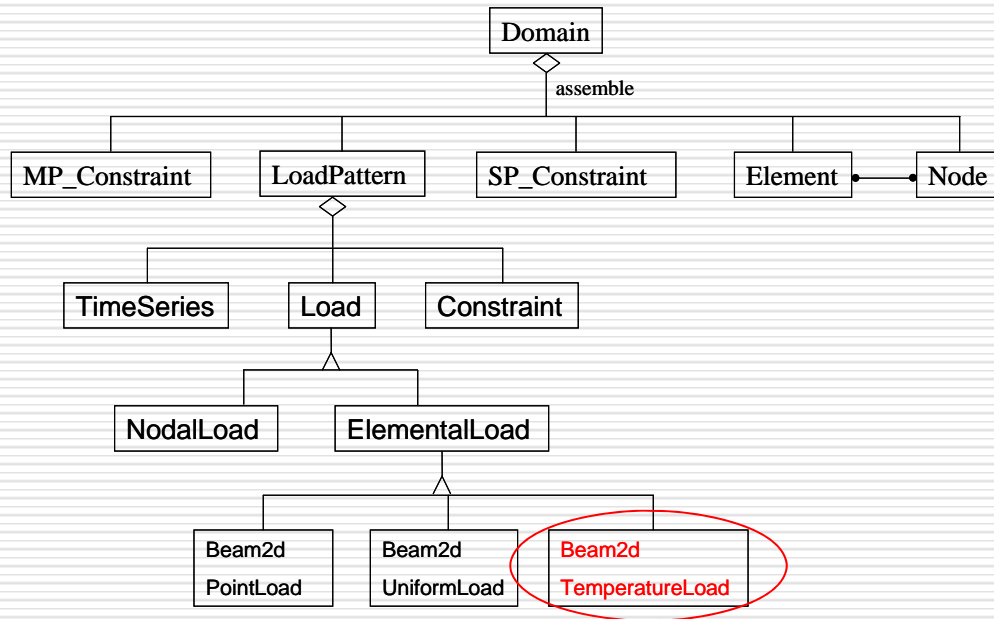
Extention of OpenSees for Thermo-mechanical analysis



Existing flowchart of mechanical analysis in OpenSees

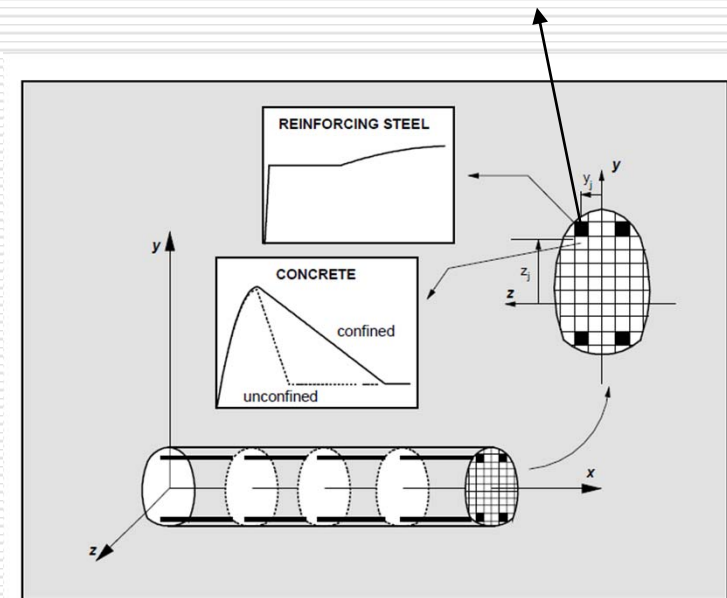
Extention of OpenSees for Thermo-mechanical Analysis

New Temperature Load class

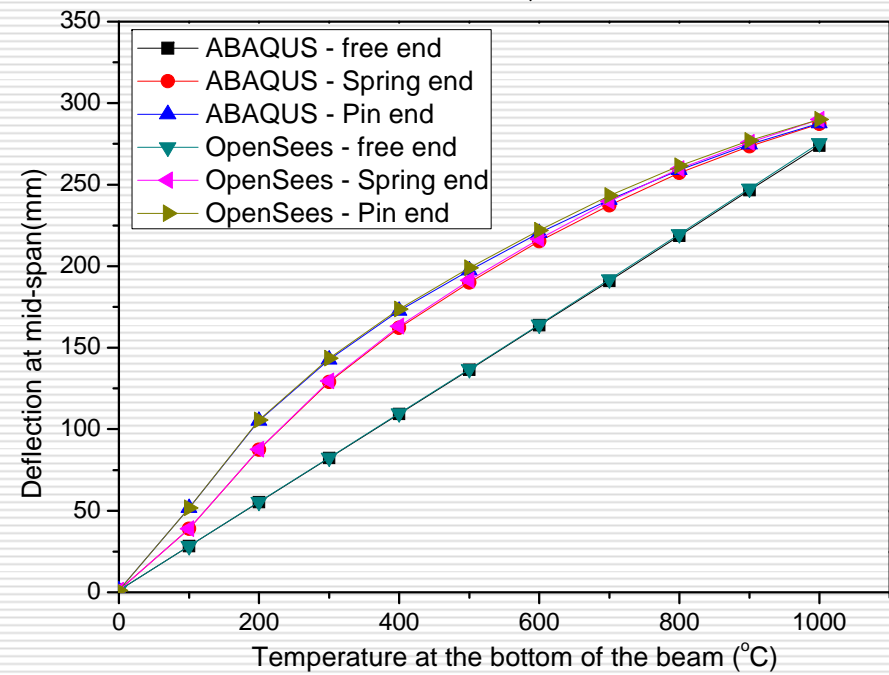
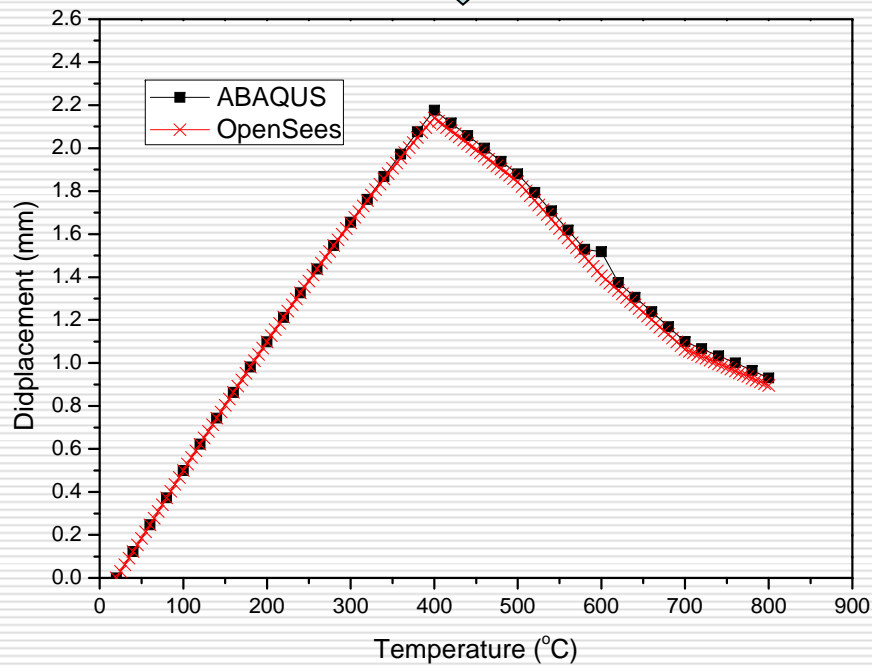
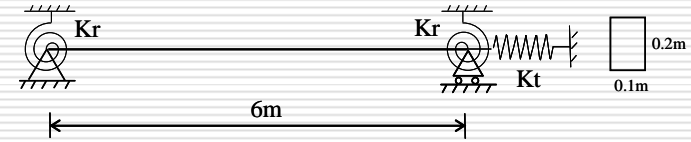
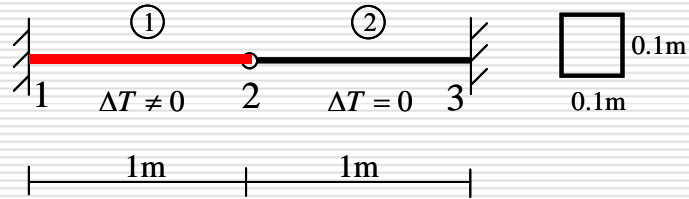


($T_1, Z_1, T_2, Z_2, \dots$)

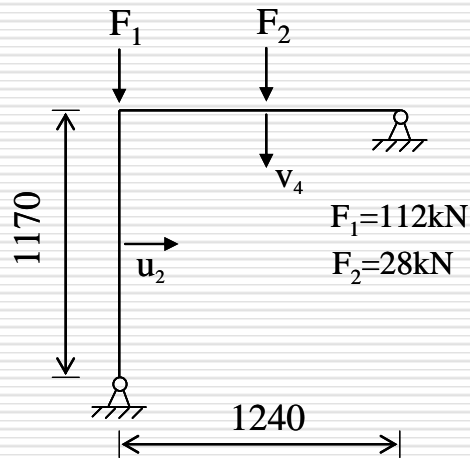
Temperature T , location Z



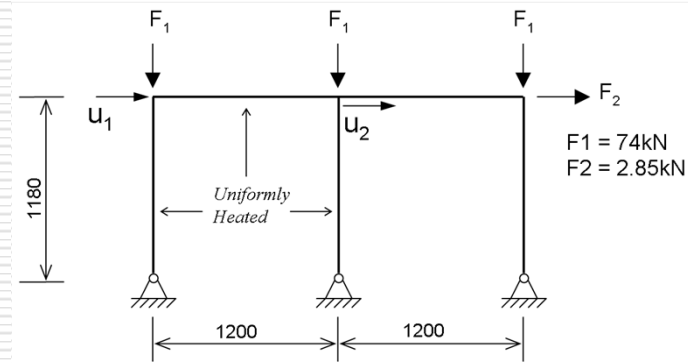
Validation



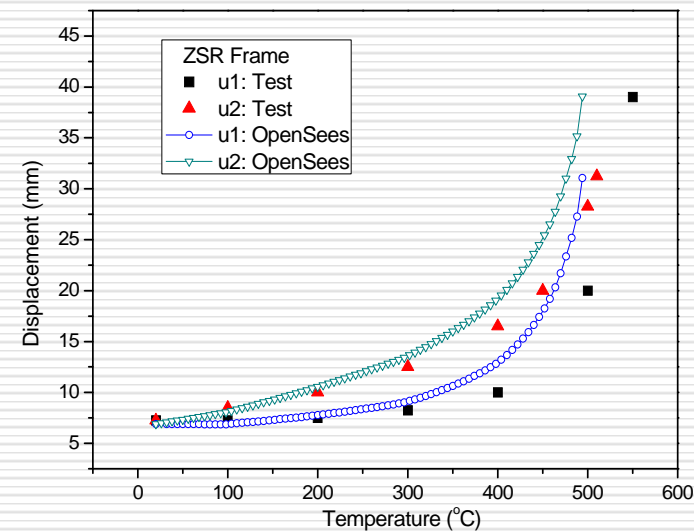
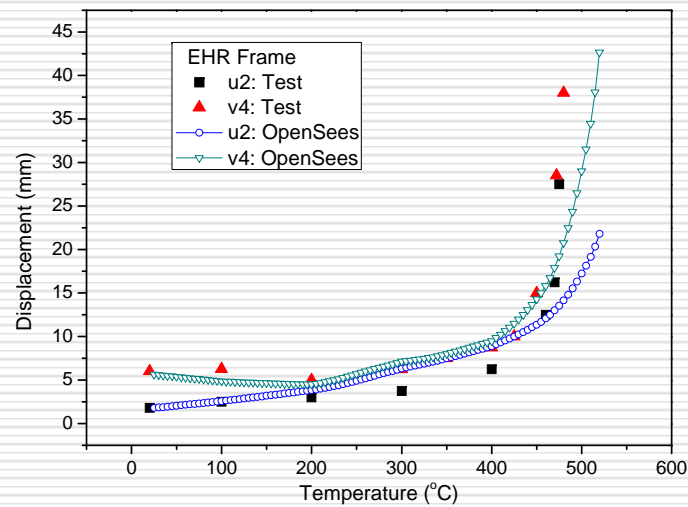
Validation- Case3



EHR Frame



ZSR Frame



Reference: Rubert, A. and Schaumann, P. "Structural steel and plane frame assemblies under fire action", Fire Safety Journal, 10, 173-184, 1986

Conclusion

The OpenSees framework is extended to cope with the thermo-mechanical analysis of frame structures in fire.

The performance of implemented program in OpenSees is verified well by comparing its results with ABAQUS as well as test data.

Further work will focus on shell element also enriching the temperature dependent material class based on test and code.



Thank you!