

ASFE 2011

Prague, 29/03/2011

Simulation of the structural behaviour of steel framed buildings in fire

APPLICATION OF STRUCTURAL FIRE ENGINEERING - ASFE2011

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SAPIENZA

School of Engineering

Sapienza University of Rome

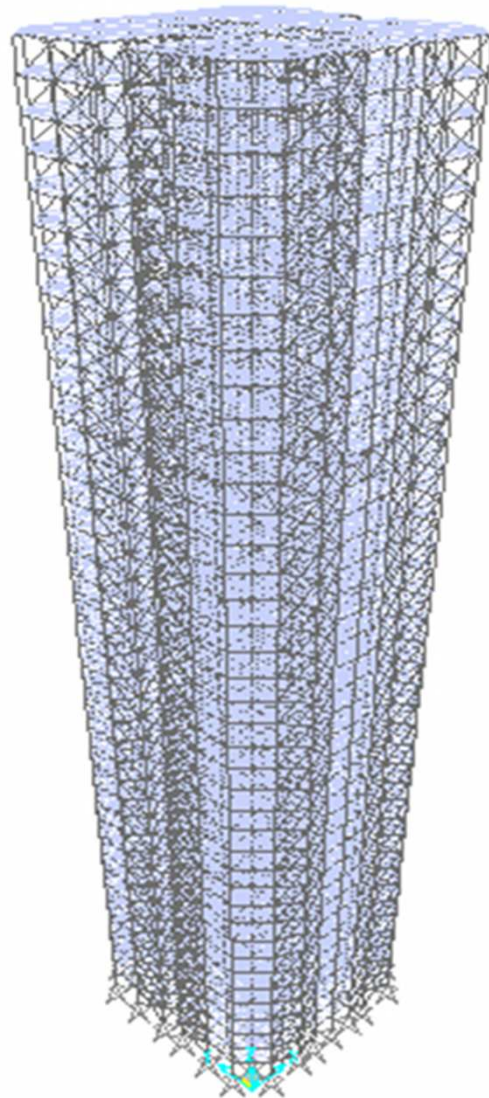


DTU - BYG
Civil Engineering Department
Technical University of Denmark

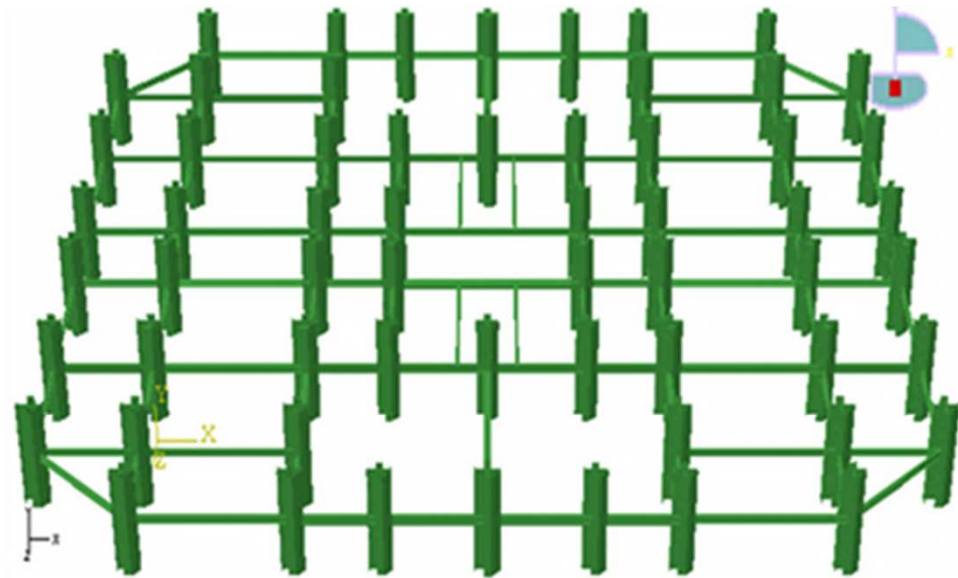
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Case study



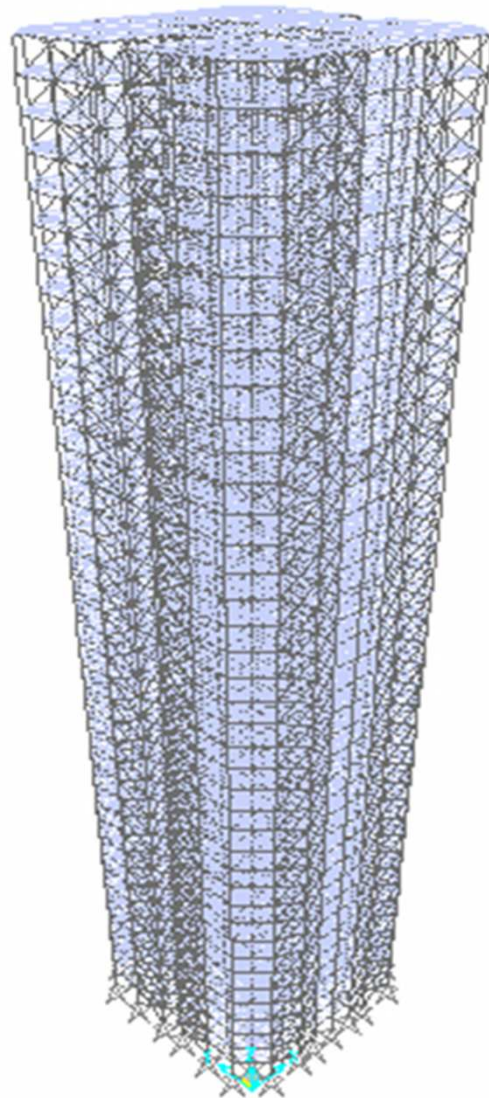
Building characteristics	Height	60 m
	Stories	40
	Floor area	35 m x 35 m
	Occupancy	offices



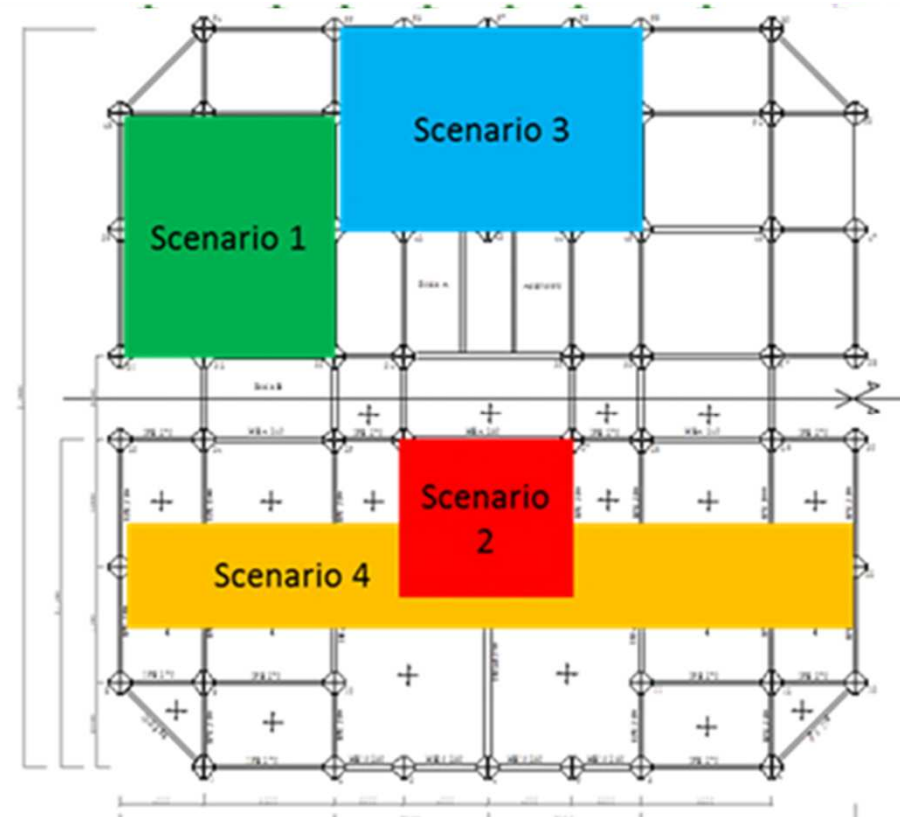
Floor model properties	Node number	2738
	Element number	1144
	Total D.O.F	9556

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Fire scenarios



Building characteristics	Height	60 m
	Stories	40
	Floor area	35 m x 35 m
	Occupancy	offices



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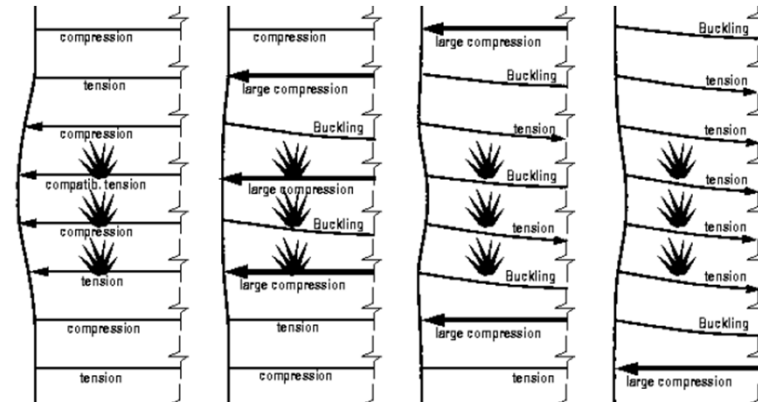
Collapse modality

① *Cardington, Gillie&al.2001*

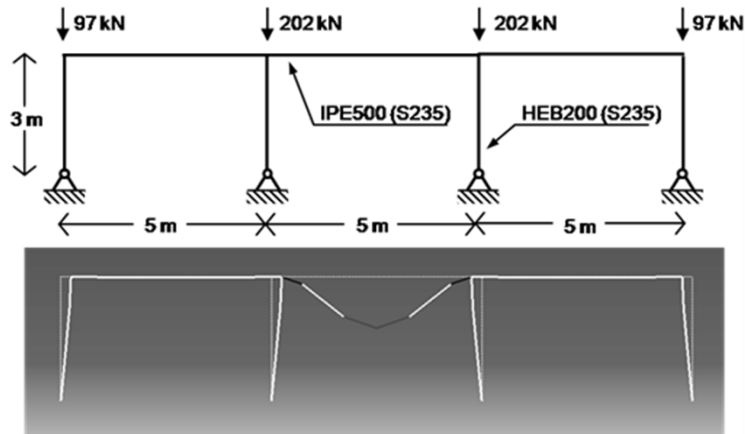


COLLAPSE STANDSTILL

② *WTC, Usmani&al.2003*

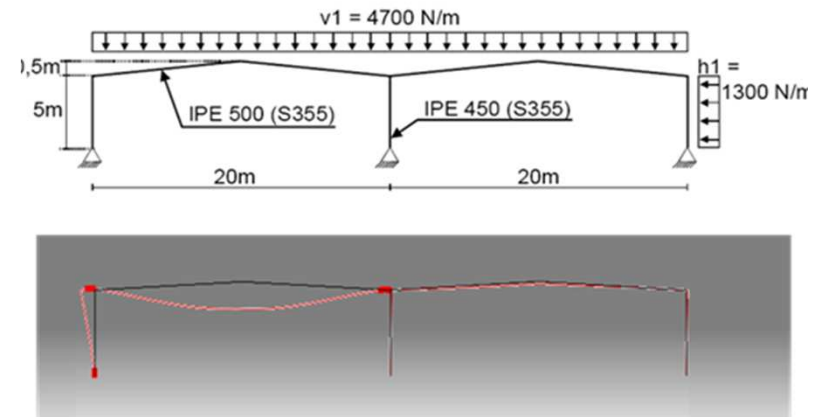


NO SWAY COLLAPSE



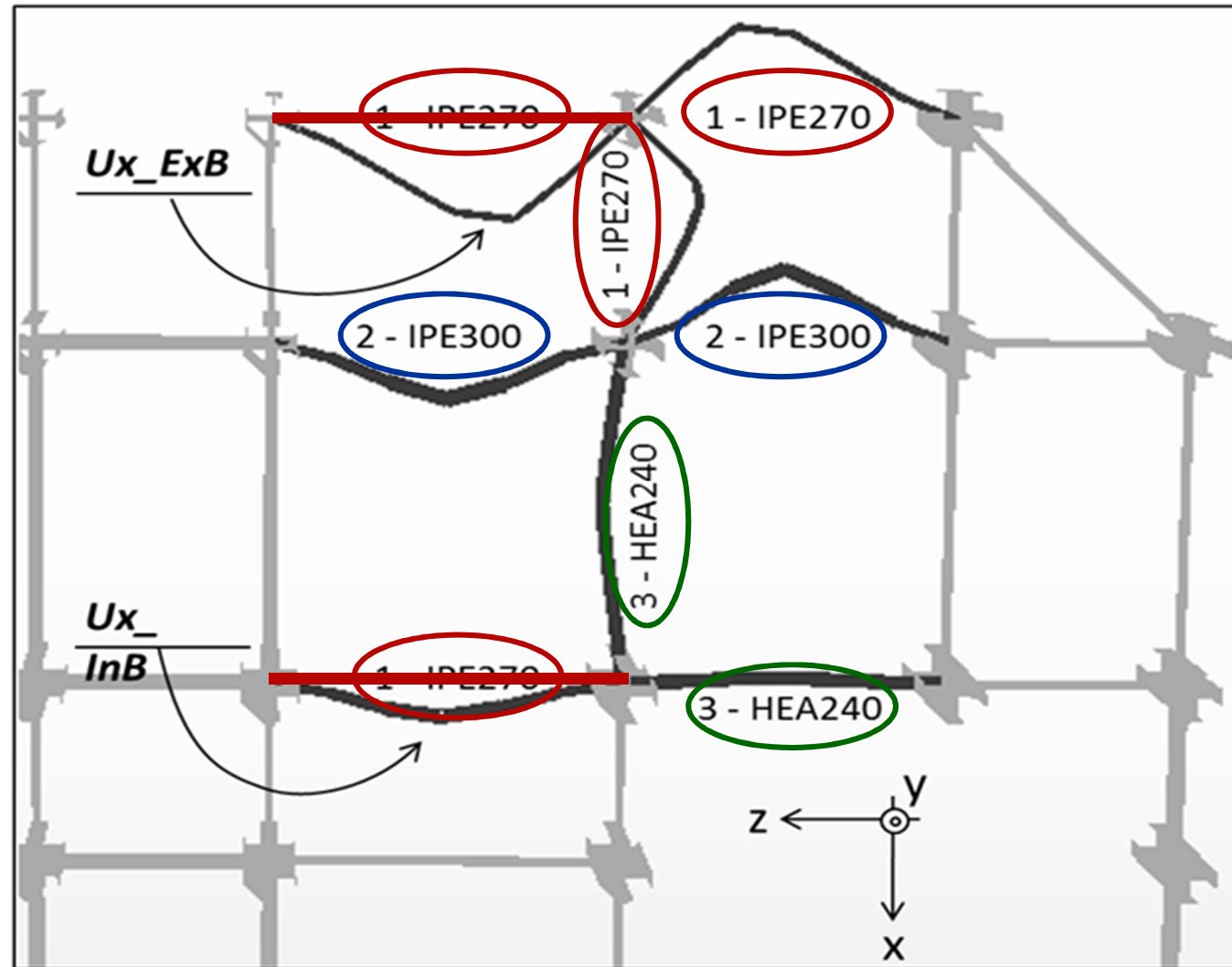
④ *Car park, Gentili&al.2010*

SWAY COLLAPSE



③ *Industrial hall, CTCIM2001*

First scenario: failure sequence

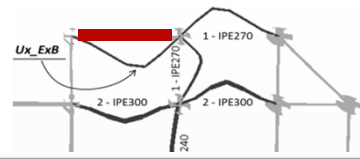


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First scenario: forces and displacements

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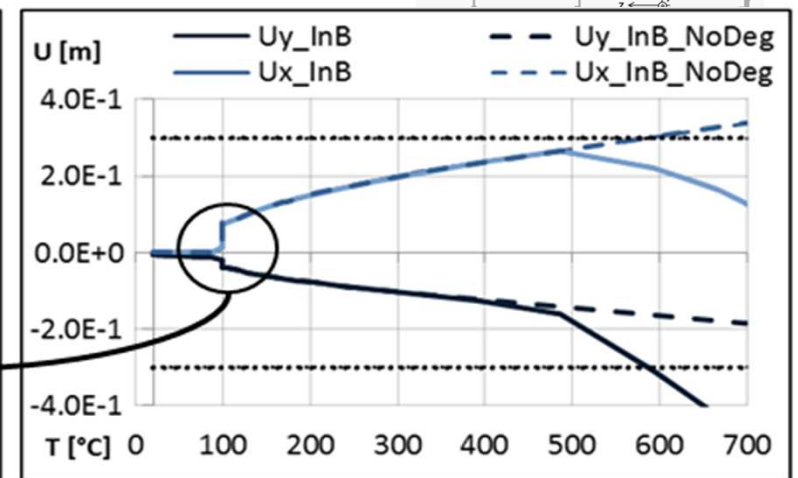
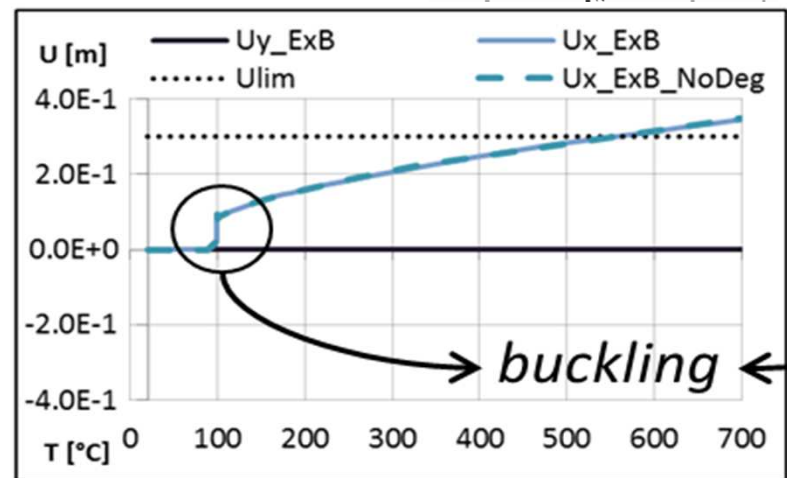
External beam (ExB)



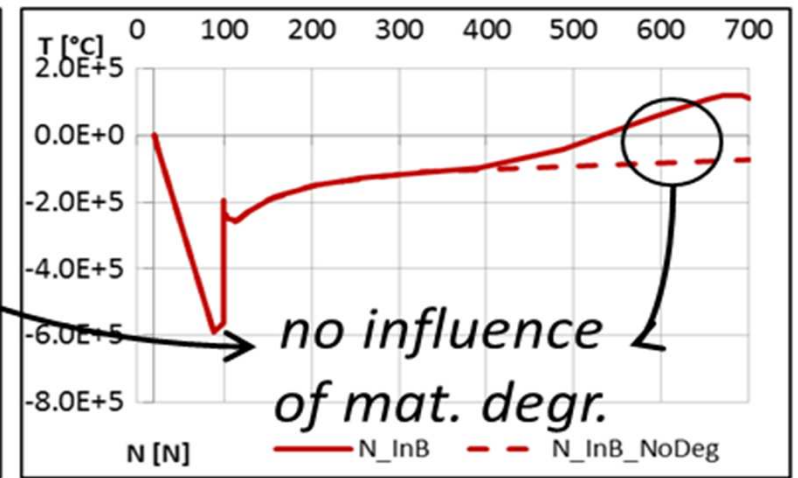
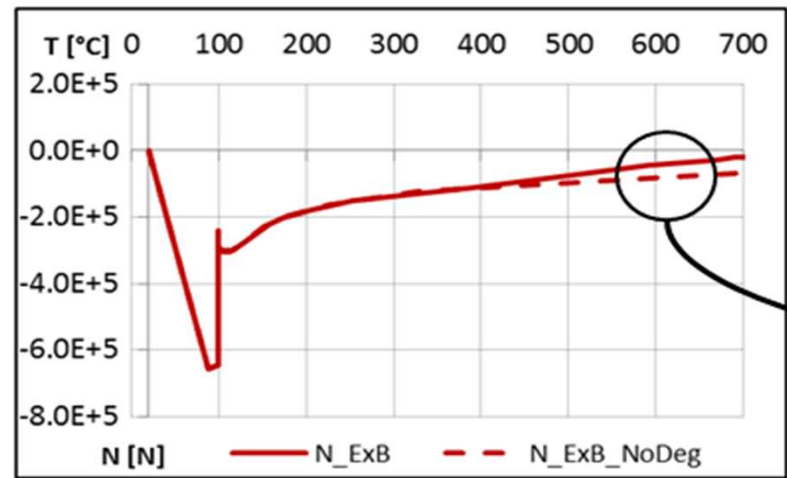
Internal beam (InB)



Mid-span displacement

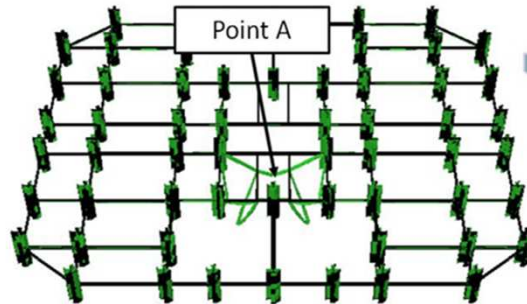


Axial force

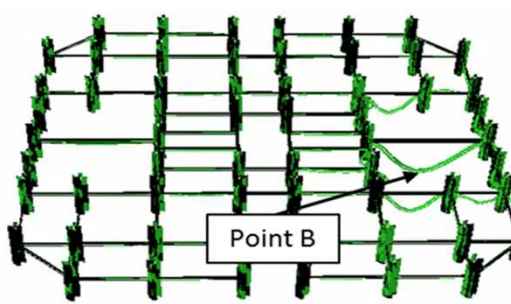


Other fire scenarios

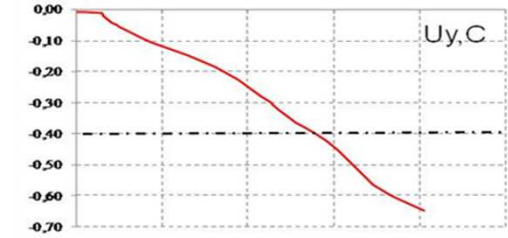
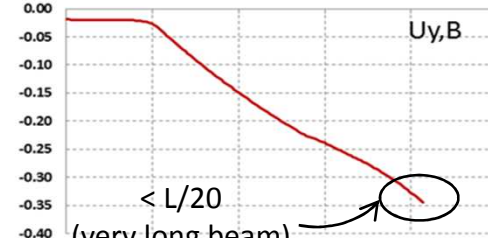
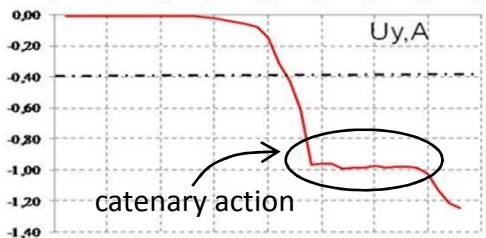
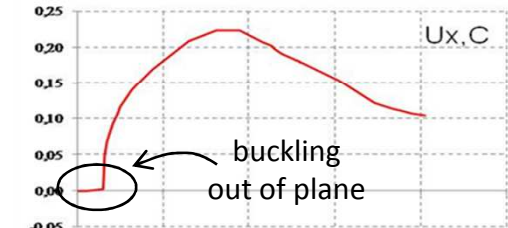
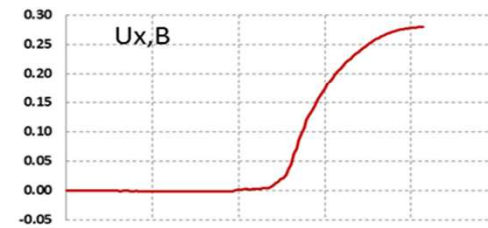
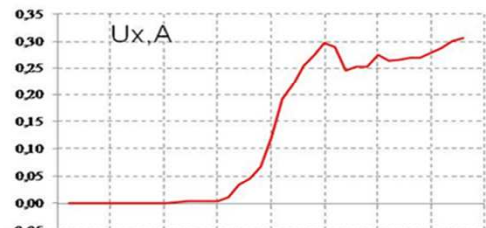
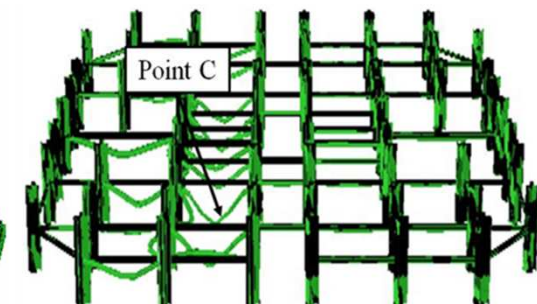
Scenario 2



Scenario 3



Scenario 4



Scenario	1 – InB	2 - PointA	3 - PointB	4 - PointC
Time (in min) at				
L/20	9	22	>20	14
Runaway	12	20	---	---

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