

# SEESL

*University at Buffalo's Structural Engineering and  
Earthquake Simulation Laboratory*

*Improved K Braced Systems Zipper Frames*

Department of Civil, Structural and Environmental Engineering  
University at Buffalo (SUNY)

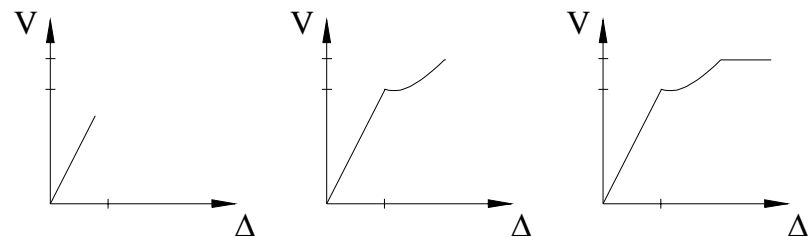
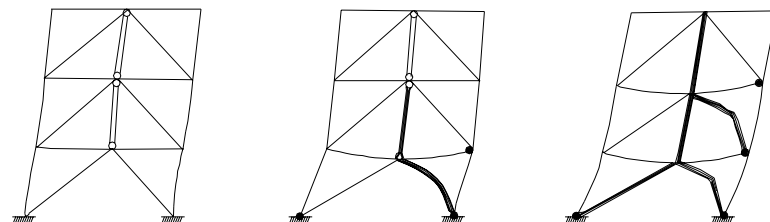
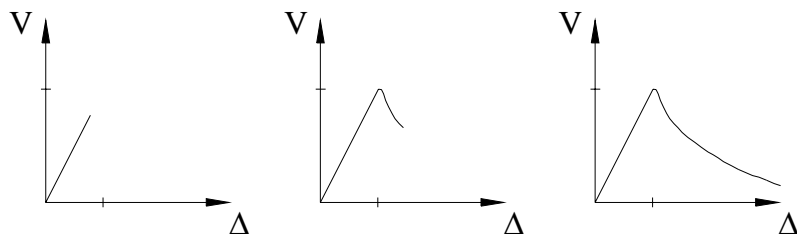
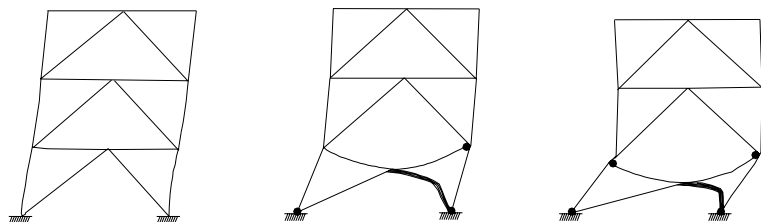


# Bare frame



# Conventional vs. Zipper Braced Frame

- ❑ Conventional braced frame behavior controlled by buckling of braces - system is unable to redistribute forces efficiently
- ❑ In a zipper braced frame, the zipper struts tie all brace-to-beam intersection points together and force all the compression braces to buckle simultaneously (Khatib, Mahin, Pister)



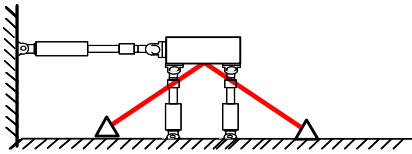
# Innovative Bracing Systems



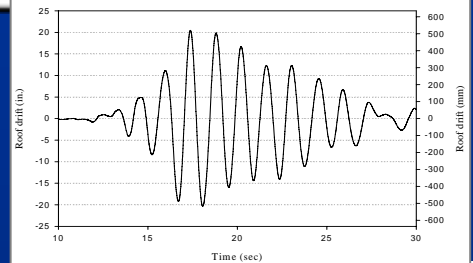
Simultaneous testing

Substructuring

Pseudo dynamic  
element test



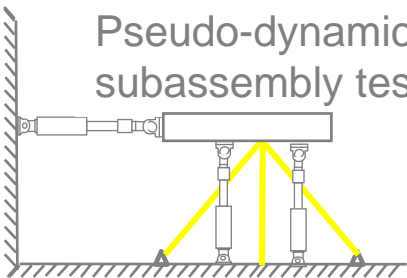
P. Benson Shing  
U of Colorado



Makola M. Abdullah  
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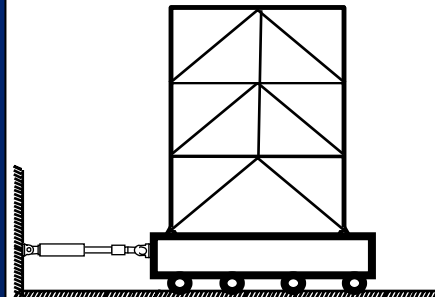
Pseudo-dynamic  
subassembly test



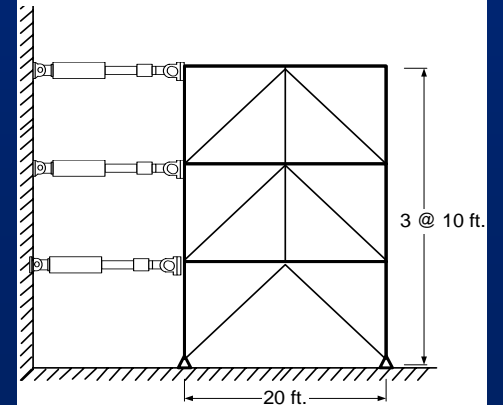
B. Stojadinovic  
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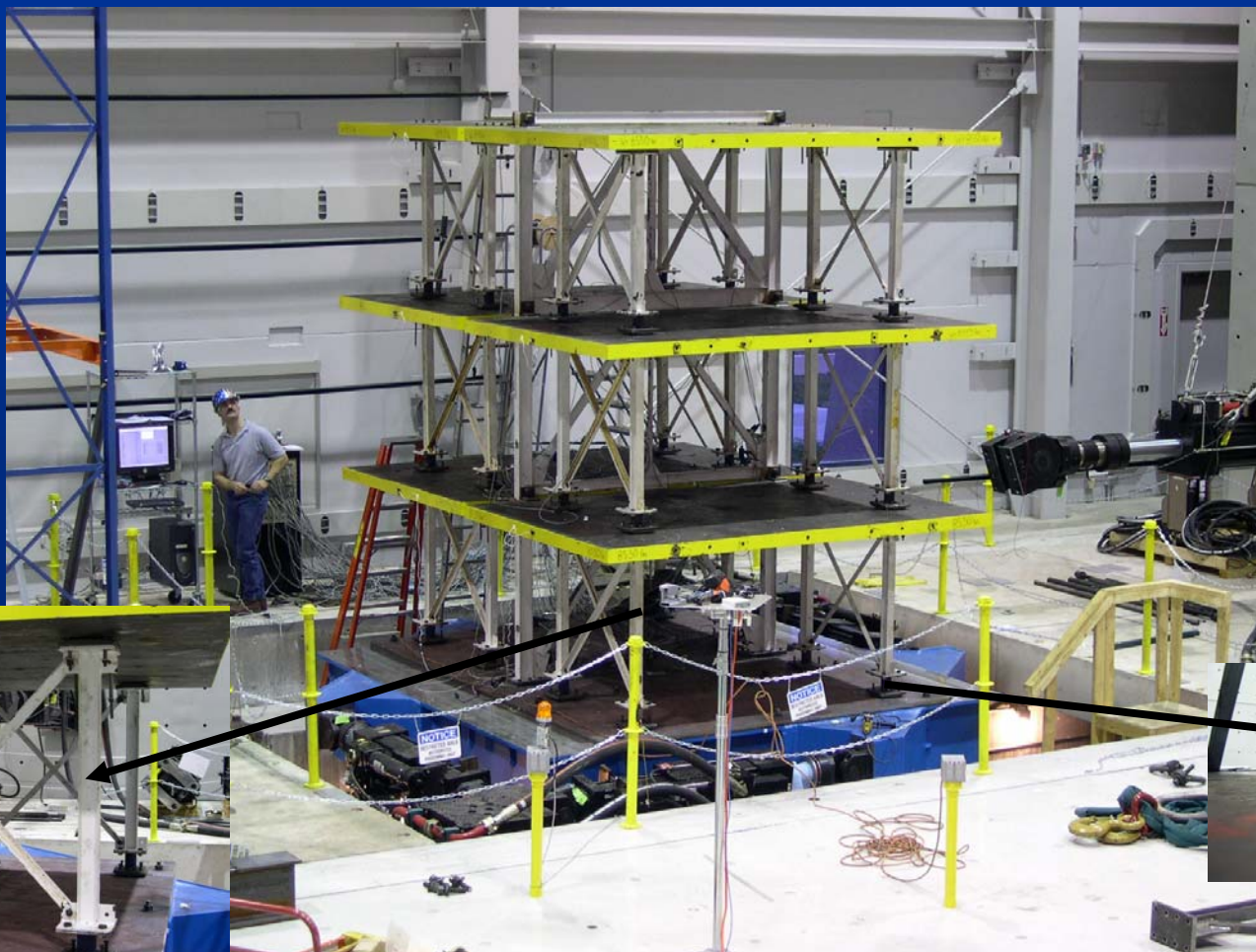
Shake Table



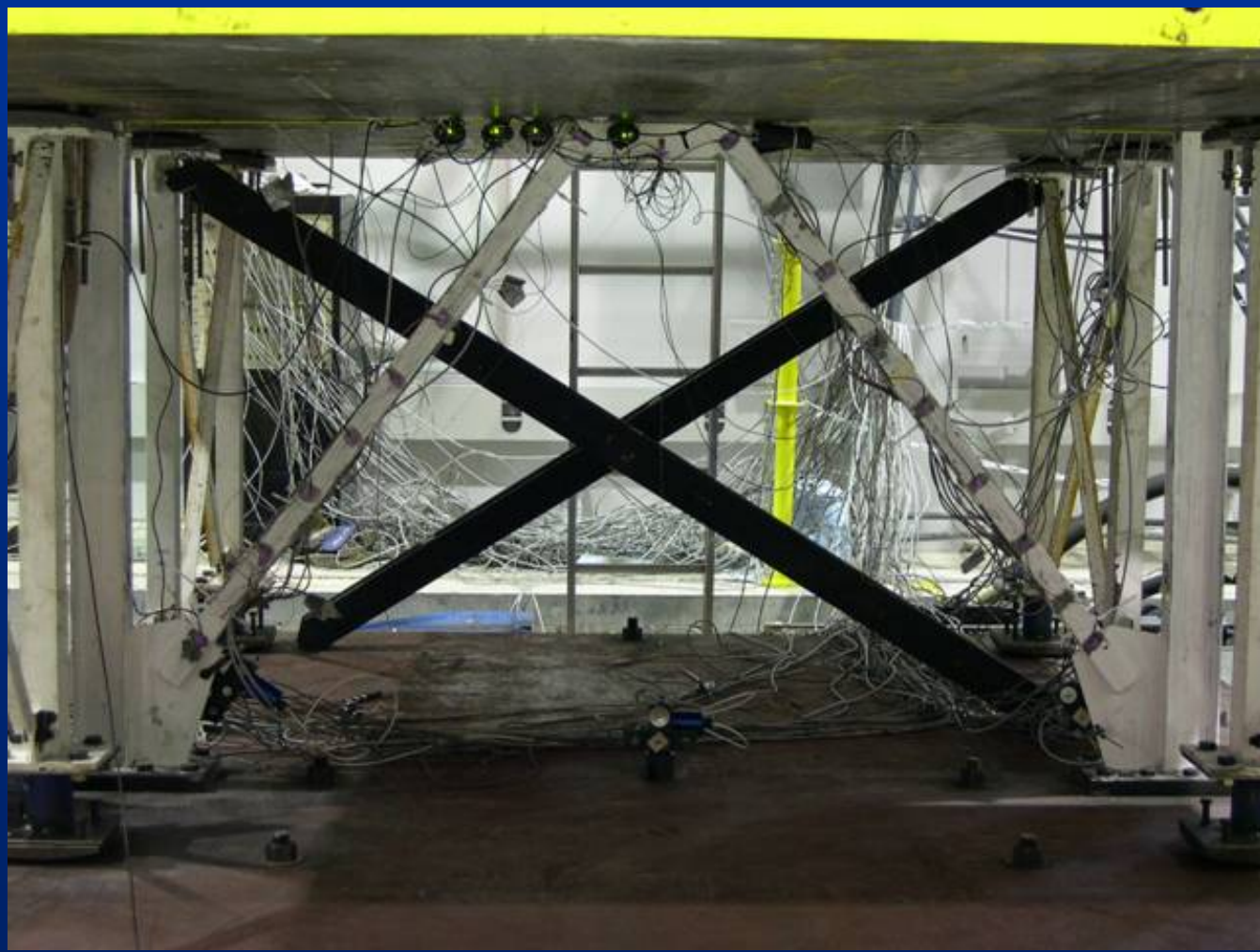
R. Leon and  
R. DesRoches  
Georgia Tech



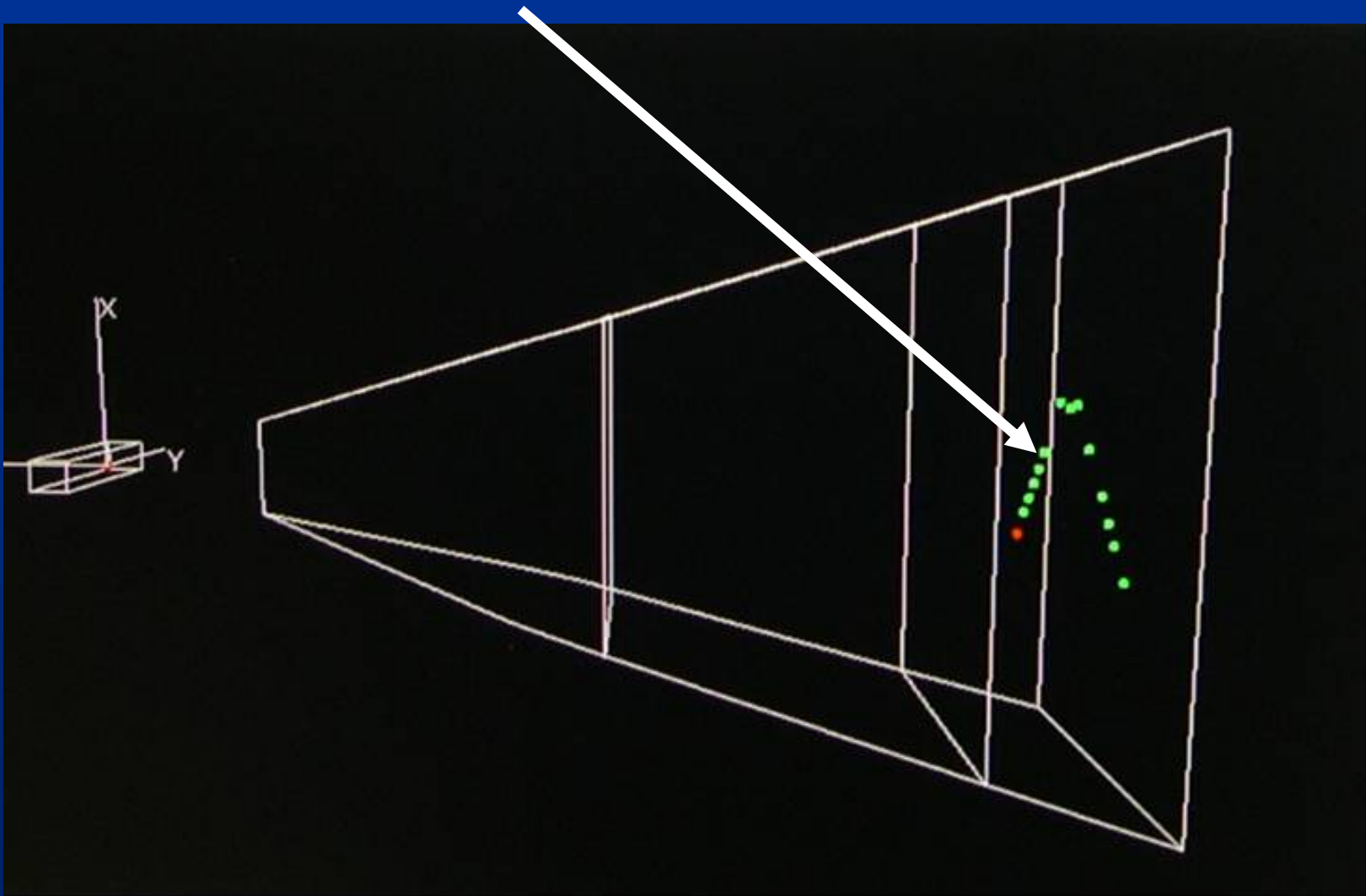
# Zipper frame and Gravity frame on Shake Table



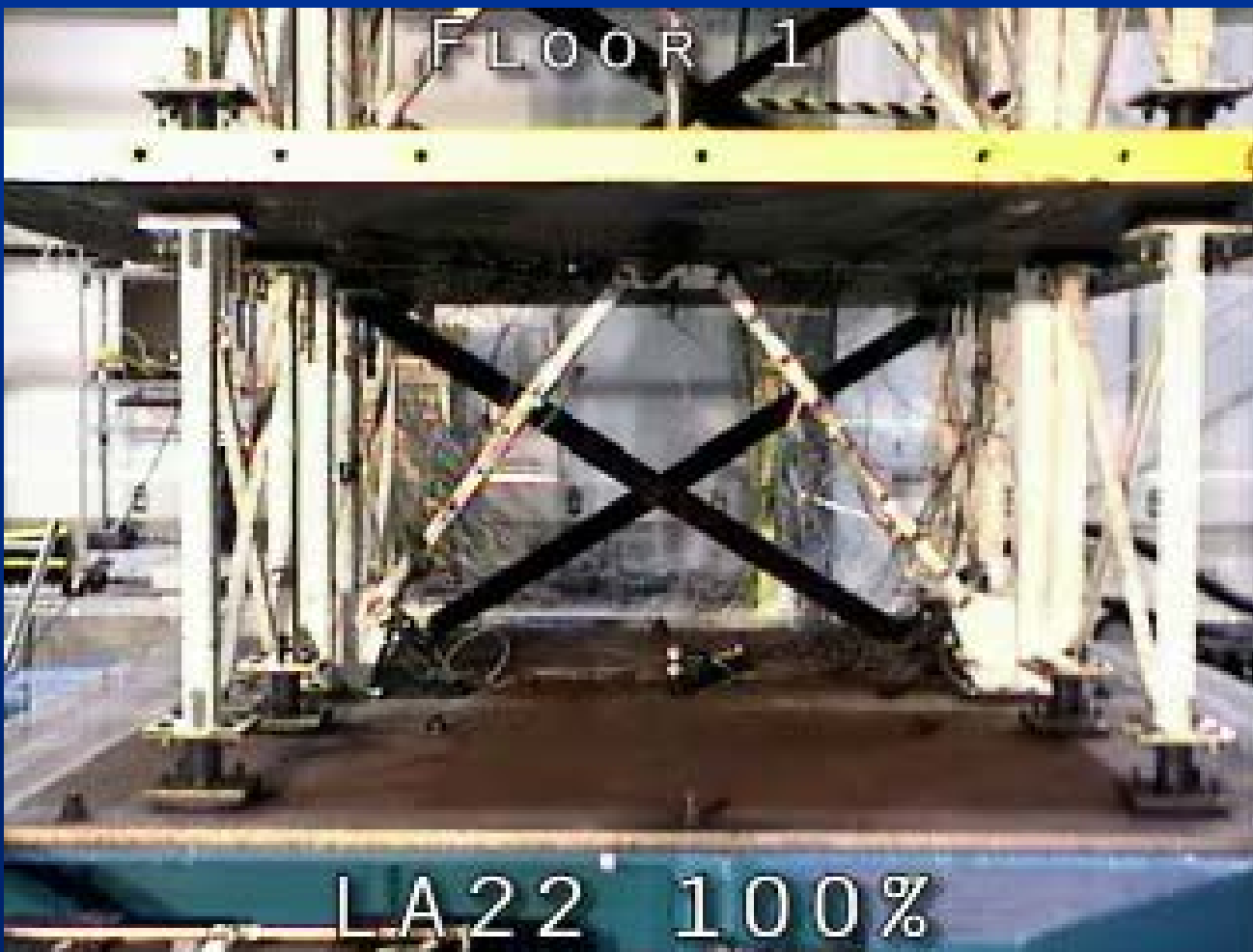
# First floor braces with optical coordinate tracking probes (Krypton system)



# Braces in the Krypton system



# Experimental Result : LA22 100%





# Experimental Result : LA22 100%



# Experimental Result : LA22 100%



# Experimental Result : LA22 100%

