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7-STORY, HALF-SCALE RC FRAME TESTS ON INELASTIC TORSION


T. Suzuki, K. J. Elwood, A.Y. Puranam
 QuakeCoRE, New Zealand
 H-J. Lee, R-J. Tsai, F-P. Hsiao, S-J. Hwang
 NCEE, Taiwan

QuakeCoRE Workshop
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History





NCEE, 2005

- Provided advise on collapse tests
- Had student do analysis of tests designed by NCEE.
- All Taiwan funding



NCEE, 2009

- Invited to develop new collapse tests considering influence of beam-column joints.
- UBC funded PhD student led project
- Ken visited for sabbatical
- Specimen and testing all Taiwan funding



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2020 test background



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- ~2015 NCRE received significant funding for new lab in Tainan.
 - Needed international collaboration to help show high demand for new facility.
- Need to find topic of common interest:
 - Taiwan
 - 2016 Meinong Earthquake – collapse of highly-vulnerable buildings in moderate earthquake, particularly soft story with torsion due to open store front and masonry wall in rear.
 - New Zealand
 - Nonlinear torsion was key topic identified in Royal Commission but needed system level tests to investigate → no appropriate facility in NZ.

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Meinong Earthquake, Taiwan



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Inelastic torsion

How well do our assessment methods estimate peak drift?

Column A2 Column A3

Column D2 Column D3

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Shake table tests

- NCRE Tainan Laboratory



2 Specimens

- 7 story, half scale
- soft/weak first story
- Uni-directional excitation

3 Irregular Systems

- Series-1A – Stiffness
- Series-1B – Damage
- Series-2 – Ductility

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Funding

- QuakeCoRE and University of Auckland:
 - Lead PhD student (Tomomi)
 - Travel funding
 - Support from UoA postdoc (Ash)
 - Component testing at UoA

- NCREE (~300,000 NZD)
 - Shake table specimens
 - Lab usage and lab personnel
 - Local expenses

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Teamwork



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Specimen-1
Series-1A
Stiffness irregularity

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

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Specimen-1
Series-1B
Damage irregularity

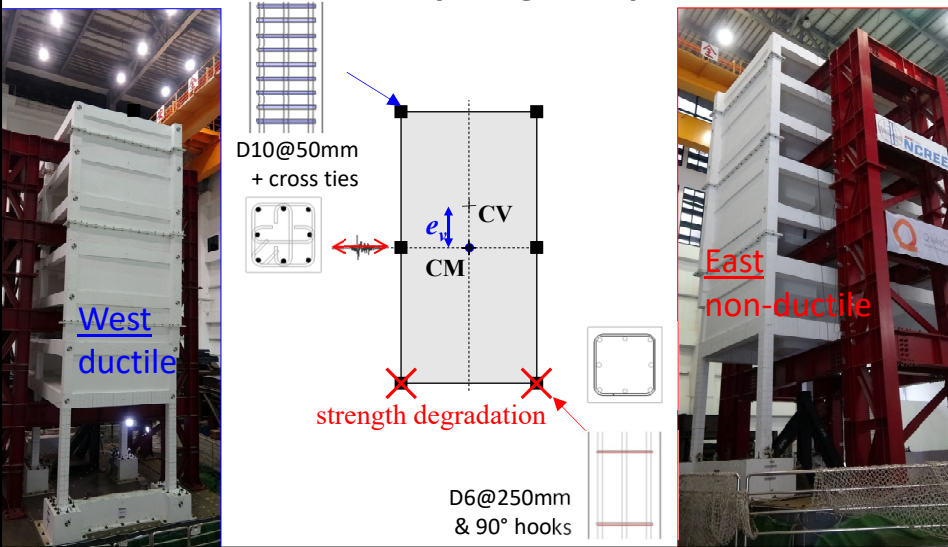
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Specimen-2
Series-2

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Ductility irregularity



West ductile

East non-ductile

strength degradation

D10@50mm
+ cross ties

e_v CV
CM

D6@250mm
& 90° hooks

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