Safety of Modular Buildings under Seismic conditions

Research Problem
In modular buildings, an alternate occurrence of framing elements and connections may distort the capacity distribution along the height of the building unlike in conventional buildings. This uneven distributions may cause the building in a sudden manner under seismic events exceeding design limits.

Methodology
Experimental Models of (a) Modular building (b) Conventional steel building
Opensees Model and real models on shaking tables of a scaled down Modular building and a conventional steel building were developed to be subjected to seismic intensities exceeding design limit to study their behaviour.
Endurance Time Excitation Functions (ETEF) Were employed to simulate increasing seismic intensities.

Conclusions
• In Modular building, Progression of damage was mostly spanning across the storey. This was seen to be responsible for a higher collapse hazard in a modular building than a conventional building.
• The progression of damage in a conventional building was upwards along the building height.
• Failure of edge connection in a modular building triggered failure of other connections in that storey quickly which resulted in a sudden jump in the IDA curve.
• It could be interpreted that the yielding or complete failure of a modular building could occur suddenly without much reserved capacity in the structure while failure is progressive in conventional building.
• Axial forces in connections of the modular building were more critical than the shear and moments in the connection.

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