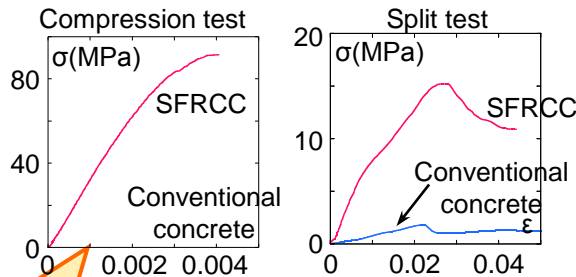


Seismic repair method for steel beam-to-column connection using SFRCC

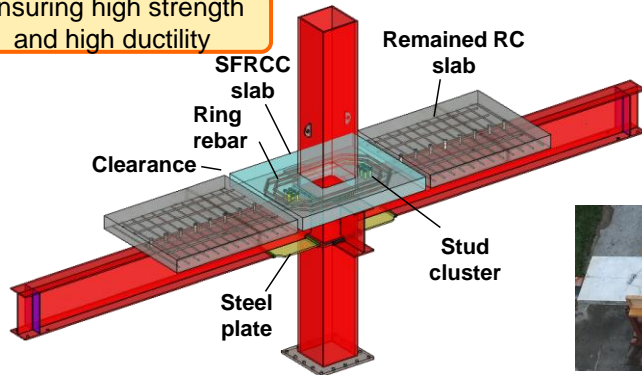
Background : During severe past earthquakes, many steel-frame buildings sustained severe damage such as cracks and brittle fracture at welded beam-to-column connections. To restore damaged steel-frame buildings for post-earthquake continuing use, it is important to rehabilitate the damaged beam-to-column connections. Various repair and strengthening methods have been developed and proposed for such rehabilitation. To provide an alternative for the repair of damaged beam-to-column connections, a repair method using SFRCC slab is proposed to increase both the stiffness and moment resistance of the beam-column connection.

Methodology : In the proposed repair method, widened steel plates are used to replace the fractured and buckled bottom flanges, and SFRCC slab is used to replace the damaged concrete floor slab portion in the vicinity of the column. Stud clusters are welded to the upper flange and embedded in the SFRCC slab. Ring rebars are cooperated with the stud cluster to transfer the load and make the SFRCC slab serve as an external diaphragm. A clearance is made between the SFRCC slab and remained RC slab; consequently, a plastic hinge is developed at the edge of the SFRCC slab, and thus the potential fracture is removed from the column face.

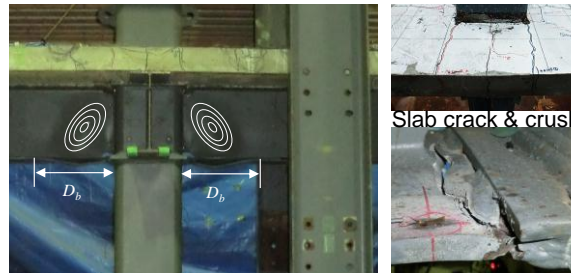


The advantage of SFRCC

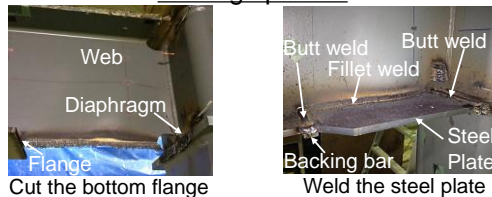
Ensuring high strength and high ductility



Schematic of the repair method



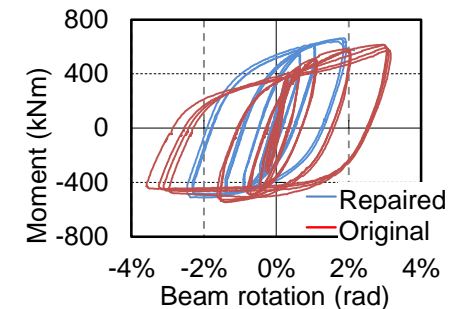
Web buckling Flange fracture
Damage pattern



Remove damaged slab Place rebar Cast SFRCC
Repair scheme



Test of the repaired connection



Beam moment-rotation relationship

Conclusion : The tests show that the connection repaired by the proposed method can develop the beam strength not smaller than that of the original connection. The SFRCC slab has nearly no damage even at the drift angle ratio up to 3%.