SMART 2008 benchmark

SMART 2008 specimen

Finite element model

Fundamental modes (self-weight + additional masses)

General torsor (xg = 1.28 m, yg = 0.92 m, zg = 0 m) (self-weight + additional loadings)

Ex (Ey): seismic loading along X (Y) direction only + gravity load

Fz (kN) Mx (kNm) My (kNm) Mz (kNm)

Ex (Fx max) 93.41 18.16 447.69 -66.05 235.63 -0.95
Ex (Fx min) -57.33 78.23 446.57 -238.04 -136.46 35.12
Ey (Fy max) -83.10 -116.29 455.23 287.85 -223.64 -10.52
Ey (Fy min) 29.28 123.68 444.09 -325.76 77.46 31.48

Maximum principal stresses for wall V01-V02 (seismic direction Ex + gravity loads)

Conclusions:
 Beam/shell FE modelling represent quite well the torsional behaviour of the structure in all first three modes.
 The first three eigen modes along X and Y directions put in motion 85% and 72% of the effective mass of the specimen.
 Deflections of the structure indicate important stress levels at junction between structural elements.

Prospects:
 Create a hybrid modelling, combining:
 ● solid elements for structural junctions,
 ● shell and beams elements for the rest of the specimen.