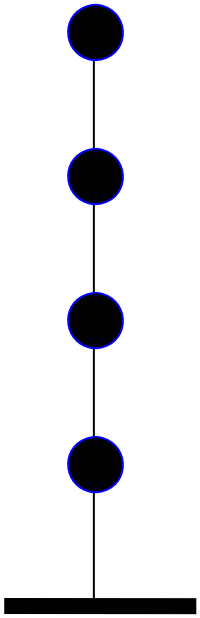
# 4-STORY MDOF MODEL WITH ELASTIC STIFFNESS

4-Story MDOF (Multi-Degree of Freedom) model with elastic stiffness



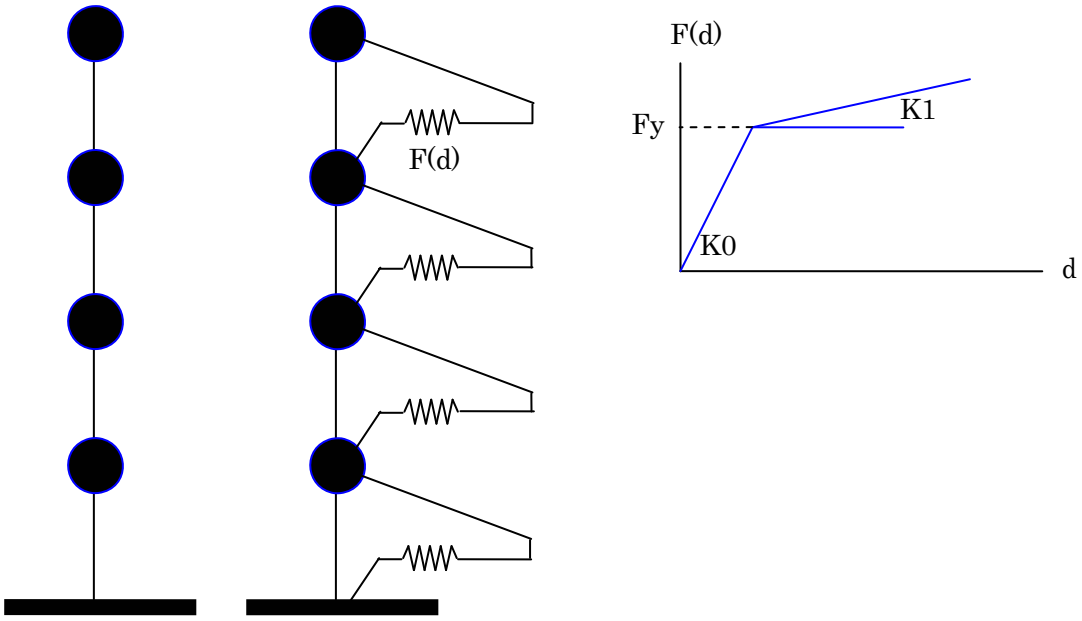
Bare frame

| | W (kN) | H (mm) | K (kN/mm) |
|---|---|---|---|
| 4 | 4894 | 4000 | 62.7 |
| 3 | 3669 | 4000 | 72.9 |
| 2 | 3691 | 4000 | 91.0 |
| 1 | 3762 | 6000 | 56.2 |

W: floor weight, H: story height, K: story stiffness

## 4-STORY MDOF MODEL WITH STEEL DAMPER

4-Story MDOF (Multi-Degree of Freedom) model with steel damper




Bare frame  Bare frame with damper

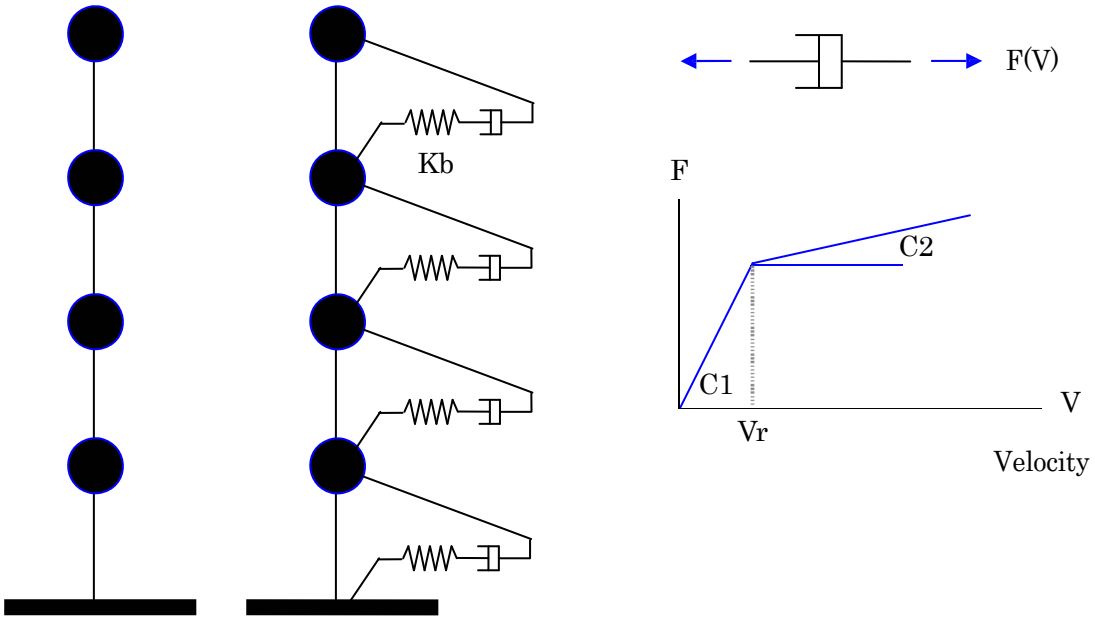
| | W (kN) | H (mm) | K (kN/mm) | K0 (kN/mm) | Fy (kN) | K1/K0 |
|---|---|---|---|---|---|---|
| 4 | 4894 | 4000 | 62.7 | 277.2 | 1848 | 0.02 |
| 3 | 3669 | 4000 | 72.9 | 447.3 | 2982 | 0.02 |
| 2 | 3691 | 4000 | 91.0 | 513.9 | 3426 | 0.02 |
| 1 | 3762 | 6000 | 56.2 | 410.3 | 4103 | 0.02 |

W: floor weight, H: story height, K: story stiffness

K0: initial stiffness of steel damper, Fy: yielding strength of steel damper

## 4-STORY MDOF MODEL WITH OIL DAMPER

4-Story MDOF (Multi-Degree of Freedom) model with oil damper




Bare frame  Bare frame with damper

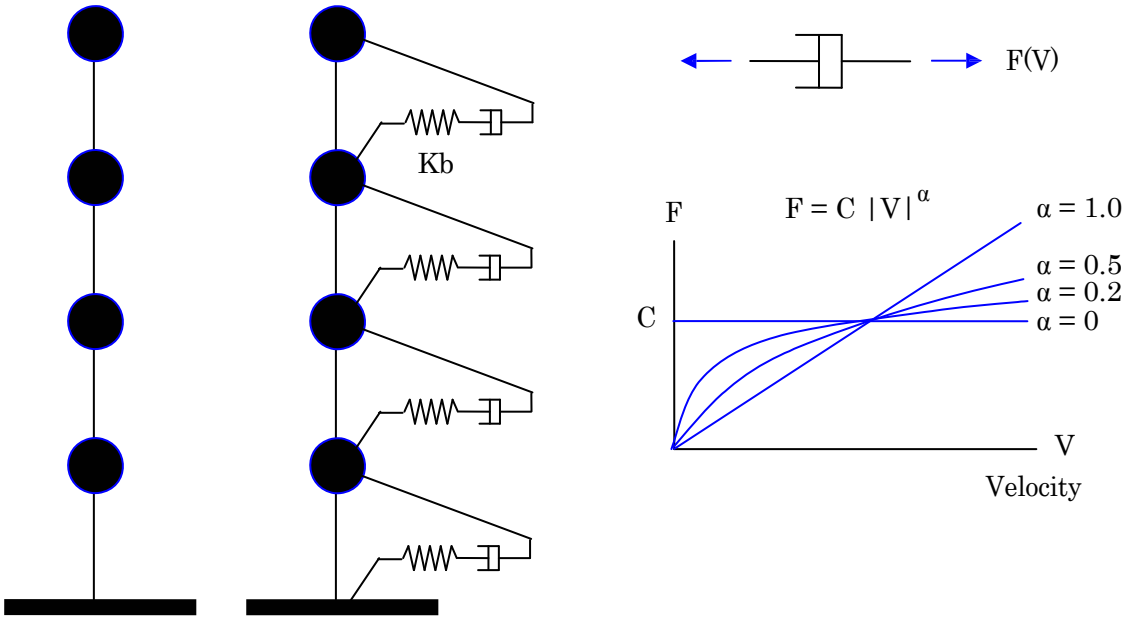
| | W (kN) | H (mm) | K (kN/mm) | Kb (kN/mm) | C1 (kN*s/mm) | C2/C1 | Vr (mm/s) |
|---|---|---|---|---|---|---|---|
| 4 | 4894 | 4000 | 62.7 | 182.3 | 24.5 | 0.02 | 62.8 |
| 3 | 3669 | 4000 | 72.9 | 211.9 | 28.5 | 0.02 | 62.8 |
| 2 | 3691 | 4000 | 91.0 | 264.7 | 35.6 | 0.02 | 62.8 |
| 1 | 3762 | 6000 | 56.2 | 163.4 | 22.0 | 0.02 | 94 |

W: floor weight, H: story height, K: story stiffness

Kb: brace stiffness, C1, C2: damping coefficient, Vr: release velocity

# 4-STORY MDOF MODEL WITH VISCOUS DAMPER

4-Story MDOF (Multi-Degree of Freedom) model with viscous damper




Bare frame  Bare frame with damper

| | W (kN) | H (mm) | K (kN/mm) | Kb (kN/mm) | C1 (kN*s/mm) | α |
|---|---|---|---|---|---|---|
| 4 | 4894 | 4000 | 62.7 | 182.3 | 24.5 | 0.02 |
| 3 | 3669 | 4000 | 72.9 | 211.9 | 28.5 | 0.02 |
| 2 | 3691 | 4000 | 91.0 | 264.7 | 35.6 | 0.02 |
| 1 | 3762 | 6000 | 56.2 | 163.4 | 22.0 | 0.02 |

W: floor weight, H: story height, K: story stiffness

Kb: brace stiffness, C: damping coefficient, α: exponent

Reference

1) Design and Construction Manual for Passive Response Control Structure (2nd Edition), Japan Society of Seismic Isolation, 2005 (in Japanese)