INELASTIC CYCLIC RESPONSE OF SPLIT K-BRACED FRAMES

by

Movses J. Kaldjian[I]

Investigations in recent years into the inelastic cyclic behavior of axially-loaded steel members with intermediate slenderness ratios show that large deflections are needed for the bracing members to be effective energy absorbers. This would mean increased ductility, thus loss of strength (load carrying capacity) for the entire structure.

This study discusses the feasibility of using a split K-bracing system, see figure, to develop rotational ductility in the girders in order to obtain larger energy absorption capacity per unit ductility.

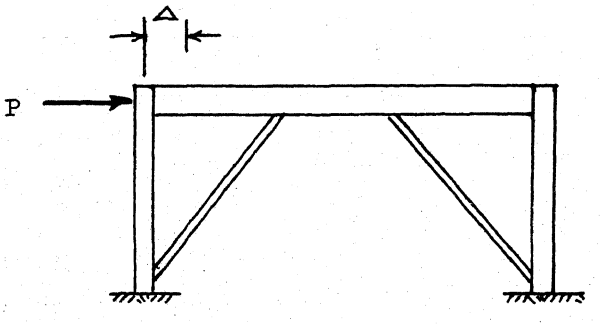
Identical single story frames with three types of bracing of equal area namely, split K (SKB), ordinary K (KB), and crossed (CB) bracing were studied numerically for hinged as well as fixed-end conditions under the same cyclic displacement load.

For the cases considered the SKB frame displayed greater energy absorption capacity than the rest. It also developed the greater girder moment in the hinged condition.

The following ratios give some of the significant points of this study,

	SKB :	KB :	CB	
Energy absorption	2.1 :	1.0 :	1.6	Hinged
	1.5 :	1.0 :	1.3	Fixed
Max. Girder Moments	1.09 :	1.00 :	0.90	Hinged
	1.05 :	1.00 :	0.85	Fixed
Max. Column Moments	.70 :	1.00 :	0.91	Hinged
	1.00 :	1.00 :	1.00	Fixed

The results of this preliminary study seem to point to the desirability of developing rotational mechanisms to increase the energy absorption capacity of frame structures.



I Associate Professor of Civil Engineering, University of Michigan, Ann Arbor, Michigan.