SDLD25 - System mass-arises with shock absorber viscous proportional (spectral response)

Summary

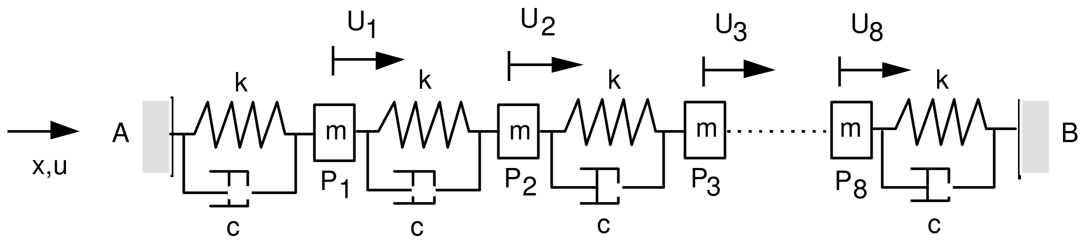
This one-way problem consists in carrying out a spectral seismic analysis of a mechanical structure made up of a set of mass-springs with viscous shock absorbers subjected to a seismic request provided in the shape of a spectrum of answer of oscillators pseudonym in acceleration.

Via this problem, one tests modal combination SRSS of the operator `COMB_SISM_MODAL` [U4.54.04]. In addition, one tests several operators of pre - treatment; `DEFI_FONCTION` and `DEFI_NAPPE`.

This test is also a test of resorption of LICE. There are no differences between the Code_Aster results and the LICE results.

1 Problem of reference

1.1 Geometry



Specific masses:	$m_{P_1}=m_{P_2}=m_{P_3}=\ldots\ldots=m_{P_8}=m$
Stiffnesses of connection:	$k_{AP1}=k_{P1P2}=k_{P2P3}=\ldots\ldots=k_{P8B}=k$
Viscous depreciation:	$c_{AP1}=c_{P1P2}=c_{P2P3}=\ldots\ldots=c_{P8B}=c$

1.2 Material properties

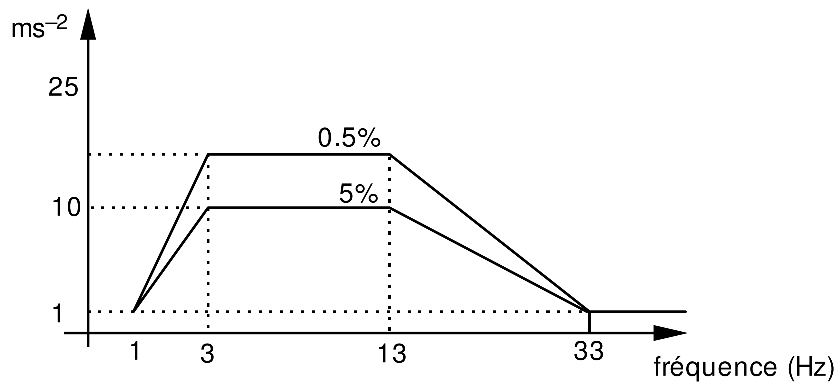
Spring of elastic translation linear	$k=10^5 N/m$
Specific mass	$m=10\,kg$
One-way viscous damping	$c=50\,N/(m/s)$

1.3 Boundary conditions and loadings

Not A and B : embedded ($u=0$)

Spectrum of acceleration to the supports $\ddot{u}(f,a)$ normalized with $1.m s^{-2}$

Points A and B : $\ddot{u}=\ddot{u}(f,a)$



2 Reference solution

2.1 Method of calculating used for the reference solution

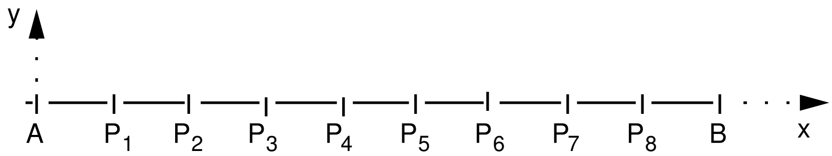
Comparison with other codes.

2.2 Results of reference

Absolute acceleration according to x at the points A , $P1$, $P2$, $P3$, $P4$.

3 Modeling A

3.1 Characteristics of modeling



Characteristics of the elements:

`DISCRETE`	with nodal masses	`M_T_D_N`
	and matrices of rigidity	`K_T_D_L`
	and matrices of damping	`A_T_D_L`

Limiting conditions:

in all the nodes	`DDL_IMPO`	`(TOUT=' OUI' DY = 0. , DZ = 0. )`
with the nodes ends		`(GROUP_NO = 'AB', DX = 0. )`

Names of the nodes:

Not $A = N1$ $P_1 = N2$

Not $B = N10$ $P_2 = N3$

....

$P_8 = N9$

3.2 Characteristics of the grid

Many nodes: 10

Many meshs and types: 9 `SEG2`

3.3 Sizes tested and results

Identification			Reference LICE	Tolerance	Reference Not regression	Tolerance
Eigen frequencies						
1			5.53	0,001	5,525	0,001
2			10.89	0,001	10,887	0,001
3			15.92	0,001	15,924	0,001
4			20.46	0,001	20,461	0,001
5			24.38	0,001	24,390	0,001
6			27.57	0,001	27,566	0,001
7			29.91	0,001	29,911	0,001
8			31.35	0,001	31,347	0,001
Size localization						
`ACCE_ABSOLU`	A	DX	1.0	0.15	1,136	0,001
	$P1$	DX	10.45	0,001	10,450	0,001
	$P2$	DX	19.03	0,001	19,030	0,001
	$P3$	DX	25.32	0,001	25,318	0,001
	$P4$	DX	28.95	0,001	28,946	0,001

3.4 Remarks

Mode	1	2	3	4	5	6	7	8
Damping (in %)	0,868	1,710	2,500	3,213	3,830	4,331	4,698	4,924
Spectrum	23.19	19.54	9,033	3,928	2,282	1,601	1,283	1,136

4 Summary of the results

Results *Aster* are identical to the LICE results until the second decimal. The variation on absolute acceleration at point A is due to the design assumption of the different pseudo-mode between LICE and *Code_Aster*.