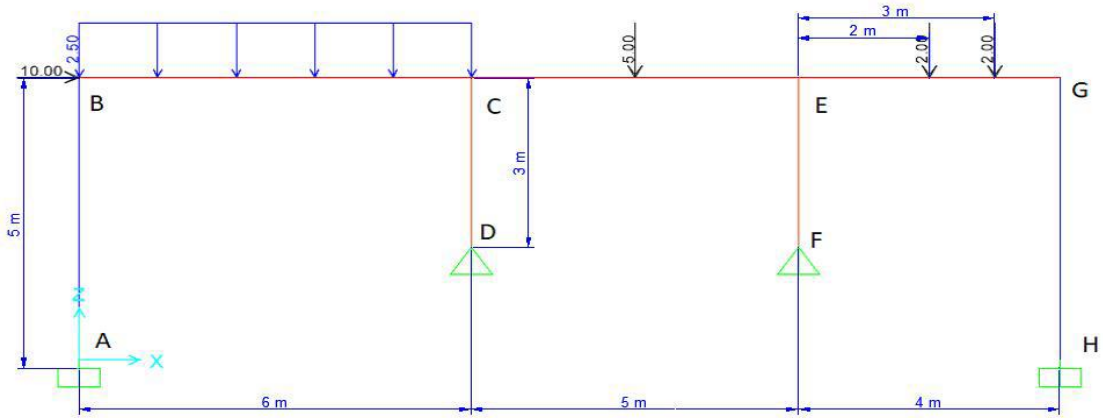
Ejemplo 1 Marcos con ladeo

Secciones				
VIGA ROJA	40.00 cm	20.00 cm	I	106666.67 cm4
COLUMNA NARANJA	30.00 cm	30.00 cm	I	67500.00 cm4
COLUMNA AZUL	40.00 cm	40.00 cm	I	213333.33 cm4



1) Inercias		E=cte	
AB=	213333.33 I	L=	5.00 m
BC=	106666.67 I	L=	6.00 m
CD=	67500.00 I	L=	3.00 m
CE=	106666.67 I	L=	5.00 m
EF=	67500.00 I	L=	3.00 m
EG=	106666.67 I	L=	4.00 m
GH=	213333.33 I	L=	5.00 m

2) Rigideces

Rab=	42666.66667
Rbc=	17777.77778
Rcd*=	16875
Rce=	21333.33333
Ref*=	16875
Reg=	26666.66667
Rgh=	42666.66667

3) Factores de distribución

Nodo A	
Dab=	0

Nodo B	
Dba=	0.705882353
Dbc=	0.294117647
	1

Nodo C	
Dcb=	0.317539072
Dcd=	0.301414041
Dce=	0.381046887
	1

Nodo D	
Ddc=	1

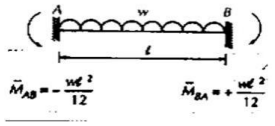
Nodo E	
Dec=	0.328837508
Def=	0.260115607
Deg=	0.411046885
	1

Nodo F	
Dfe=	1

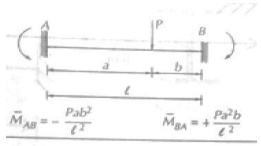
Nodo G	
Dge=	0.384615385
Dgh=	0.615384615
	1

Nodo H	
Dhg=	0

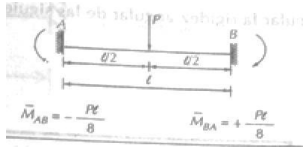
4) Momentos fijos



w=	2.50 T/m	Mbc=	-7.500 T-m
		Mcb=	7.500 T-m



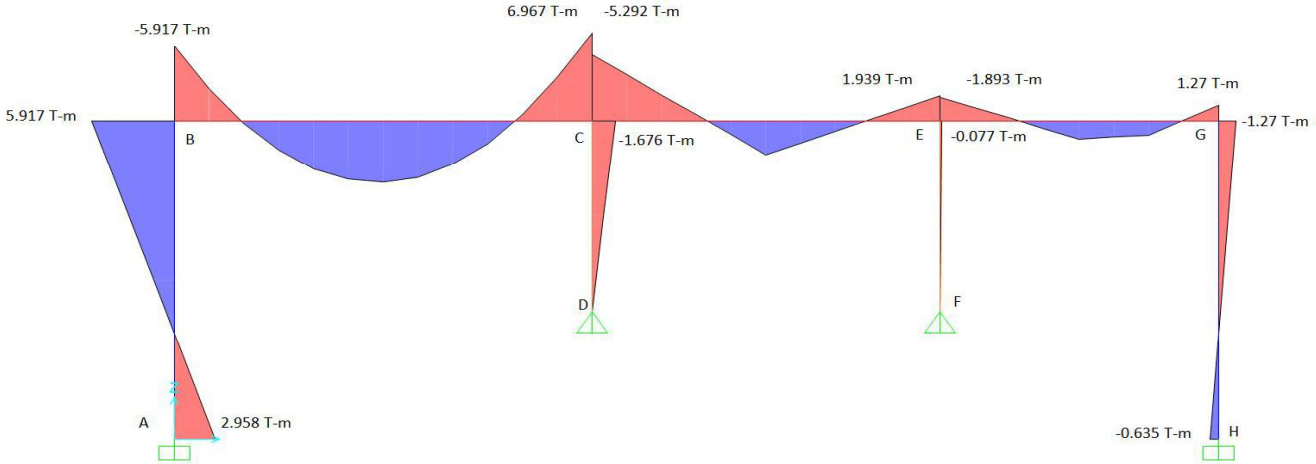
P=	5.00 T	Mce=	-3.125 T-m
		Mec=	3.125 T-m



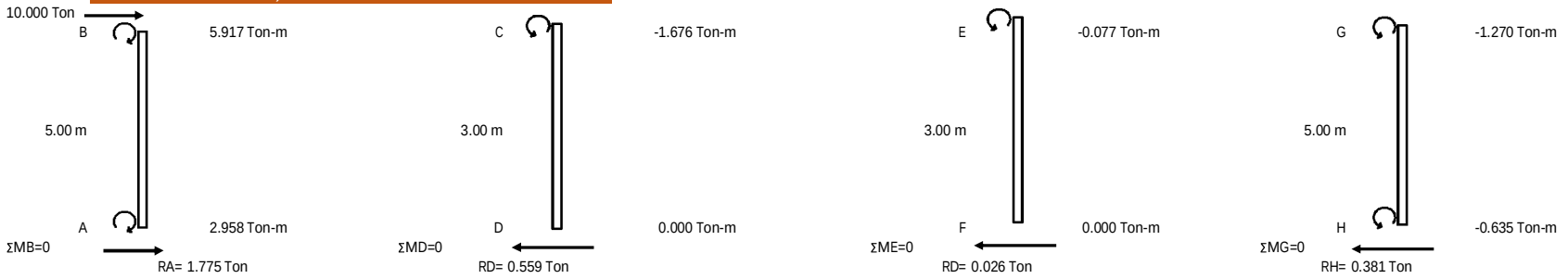
P=	2.00 T	Meg=	-1.375 T-m
		Mge=	2.125 T-m

5) Distribución de momentos sin ladeo (CROSS SIN LADEO)

Nodo	A	B		C			D	E			F	G		H
ELEMENTO	AB	BA	BC	CB	CD	CE	DC	EC	EF	EG	FE	GE	GH	HG
FD	0	0.705882353	0.294117647	0.317539072	0.301414041	0.381046887	1	0.328837508	0.260115607	0.411046885	1	0.384615385	0.615384615	0
MF	0.000 Ton-m	0.000 Ton-m	-7.500 Ton-m	7.500 Ton-m	0.000 Ton-m	-3.125 Ton-m	0.000 Ton-m	3.125 Ton-m	0.000 Ton-m	-1.375 Ton-m	0.000 Ton-m	2.125 Ton-m	0.000 Ton-m	0.000 Ton-m
1D	0	5.294117647	2.205882353	-1.389233441	-1.31868643	-1.667080129	0	-0.57546564	-0.455202312	-0.719332049	0	-0.817307692	-1.307692308	0
1T	2.647058824	0	-0.69461672	1.102941176	0	-0.28773282	0	-0.83354006	0	-0.408653846	0	-0.359666024	0	-0.653846154
2D	0	0.490317685	0.204299035	-0.258860505	-0.245715245	-0.310632606	0	0.40847995	0.323114023	0.510599938	0	0.138333086	0.221332938	0
2T	0.245158843	0	-0.129430253	0.102149518	0	0.204239975	0	-0.1553163	0	0.069166543	0	0.255299969	0	0.110666469
3D	0	0.091362531	0.038067721	-0.097290635	-0.092350095	-0.116748762	0	0.028329272	0.022408897	0.035411591	0	-0.098192296	-0.157107673	0
3T	0.045681266	0	-0.048645318	0.019033861	0	0.014164636	0	-0.05837438	0	-0.049096148	0	0.017705795	0	-0.078553837
4D	0	0.034337871	0.014307446	-0.01054182	-0.010006493	-0.012650184	0	0.035340341	0.027954762	0.044175426	0	-0.006809921	-0.010895874	0
4T	0.017168936	0	-0.00527091	0.007153723	0	0.01767017	0	-0.00632509	0	-0.003404961	0	0.022087713	0	-0.005447937
5D	0	0.003720642	0.001550268	-0.007882556	-0.00748227	-0.009459067	0	0.003199606	0.002530939	0.003999508	0	-0.008495274	-0.013592439	0
5T	0.001860321	0	-0.003941278	0.000775134	0	0.001599803	0	-0.00472953	0	-0.004247637	0	0.001999754	0	-0.006796219
6D	0	0.002782079	0.001159199	-0.000754135	-0.000715839	-0.000904962	0	0.00295203	0.002335102	0.003690038	0	-0.000769136	-0.001230618	0
6T	0.001391039	0	-0.000377068	0.0005796	0	0.001476015	0	-0.00045248	0	-0.000384568	0	0.001845019	0	-0.000615309
7D	0	0.000266165	0.000110902	-0.000652738	-0.000619591	-0.000783286	0	0.000275253	0.00021773	0.000344066	0	-0.000709623	-0.001135396	0
∑M	2.958 Ton-m	5.917 Ton-m	-5.917 Ton-m	6.967 Ton-m	-1.676 Ton-m	-5.292 Ton-m	0.000 Ton-m	1.969 Ton-m	-0.077 Ton-m	-1.893 Ton-m	0.000 Ton-m	1.270 Ton-m	-1.270 Ton-m	-0.635 Ton-m

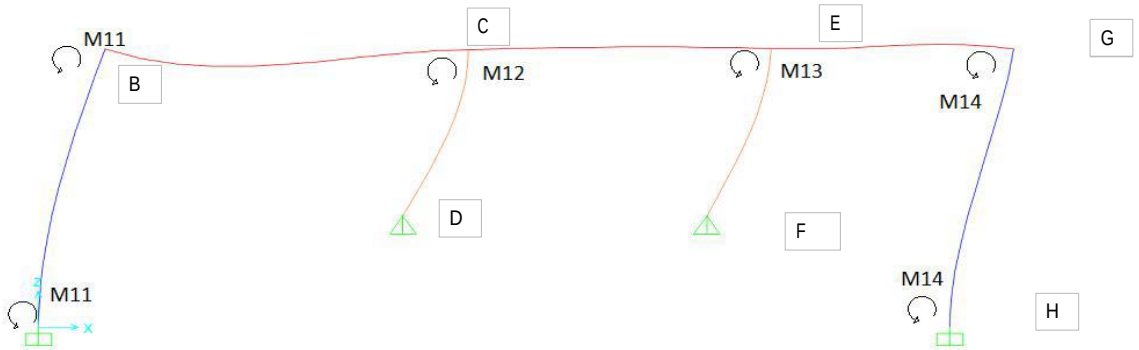


6) Reacciones en la base



F=	10.810 Ton

7) Imposición de momentos



M11=	-10.000 Ton-m

$$M12 = \frac{M11 \cdot EI_{(cd)} \cdot L_{(ab)}^2}{2EI_{(ab)} \cdot L_{(cd)}^2} = -4.395 \text{ Ton-m}$$

$$M13 = \frac{M11 \cdot EI_{(ef)} \cdot L_{(ab)}^2}{2EI_{(ab)} \cdot L_{(ef)}^2} = -4.395 \text{ Ton-m}$$

$$M14 = \frac{M11 \cdot EI_{(gh)} \cdot L_{(ab)}^2}{EI_{(ab)} \cdot L_{(gh)}^2} = -10.000 \text{ Ton-m}$$

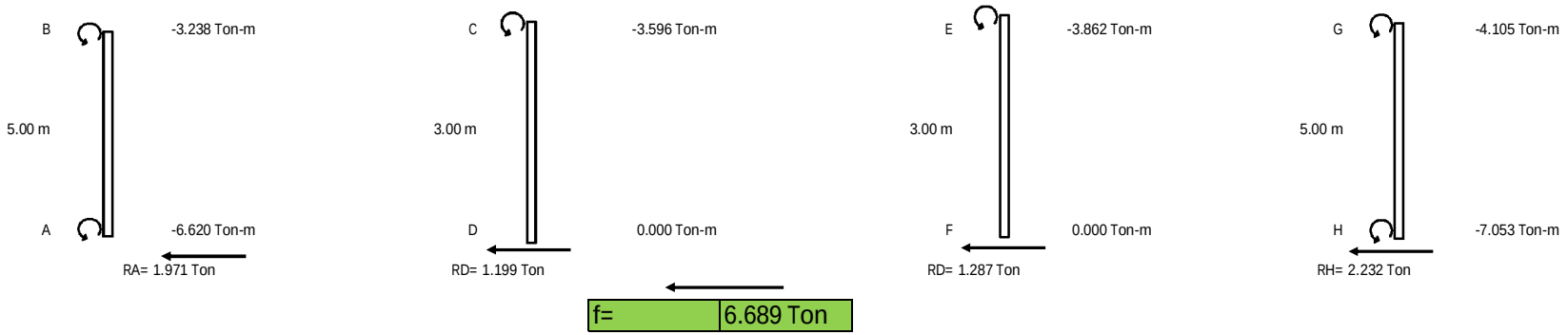
$$M_{12} = \frac{1}{2} M_{11} \cdot \frac{I_2/L_2^2}{I_2/L_2^2}$$

Columnas articuladas

8) Distribución de momentos con ladeo (CROSS CON LADEO)

Nodo	A	B		C			D	E			F	G		H
ELEMENTO	AB	BA	BC	CB	CD	CE	DC	EC	EF	EG	FE	GE	GH	HG
FD	0	0.705882353	0.294117647	0.317539072	0.301414041	0.381046887	1	0.328837508	0.260115607	0.411046885	1	0.384615385	0.615384615	0
MF	-10.000 Ton-m	-10.000 Ton-m	0.000 Ton-m	0.000 Ton-m	-4.395 Ton-m	0.000 Ton-m	0.000 Ton-m	0.000 Ton-m	-4.395 Ton-m	0.000 Ton-m	0.000 Ton-m	0.000 Ton-m	-10.000 Ton-m	-10.000 Ton-m
1D	0	7.058823529	2.941176471	1.395435376	1.324573423	1.674522451	0	1.445086705	1.143086163	1.806358382	0	3.846153846	6.153846154	0
1T	3.529411765	0	0.697717688	1.470588235	0	0.722543353	0	0.837261226	0	1.923076923	0	0.903179191	0	3.076923077
2D	0	-0.492506603	-0.205211085	-0.69640497	-0.661040655	-0.835685964	0	-0.90770272	-0.718007033	-1.134628398	0	-0.347376612	-0.555802579	0
2T	-0.246253302	0	-0.348202485	-0.102605542	0	-0.453851359	0	-0.41784298	0	-0.173688306	0	-0.567314199	0	-0.277901289
3D	0	0.245789989	0.102412496	0.176696808	0.167723923	0.21203617	0	0.194517675	0.15386652	0.243147093	0	0.218197769	0.34911643	0
3T	0.122894995	0	0.088348404	0.051206248	0	0.097258837	0	0.106018085	0	0.109098884	0	0.121573547	0	0.174558215
4D	0	-0.062363579	-0.025984825	-0.047143465	-0.044749461	-0.056572158	0	-0.07073853	-0.055955281	-0.08842316	0	-0.046759056	-0.07481449	0
4T	-0.03118179	0	-0.023571733	-0.012992412	0	-0.035369264	0	-0.02828608	0	-0.023379528	0	-0.04421158	0	-0.037407245
5D	0	0.01663887	0.006932863	0.015356722	0.014576888	0.018428066	0	0.01698959	0.013439031	0.021236987	0	0.017004454	0.027207126	0
5T	0.008319435	0	0.007678361	0.003466431	0	0.008494795	0	0.009214033	0	0.008502227	0	0.010618493	0	0.013603563
6D	0	-0.005420019	-0.002258341	-0.003798157	-0.003605281	-0.004557788	0	-0.00582577	-0.004608276	-0.007282214	0	-0.004084036	-0.006534458	0
6T	-0.00271001	0	-0.001899078	-0.001129171	0	-0.002912885	0	-0.00227889	0	-0.002042018	0	-0.003641107	0	-0.003267229
7D	0	0.001340526	0.000558552	0.001283511	0.001218332	0.001540213	0	0.001420878	0.001123937	0.001776097	0	0.001400426	0.002240681	0
∑M	-6.620 Ton-m	-3.238 Ton-m	3.238 Ton-m	2.250 Ton-m	-3.596 Ton-m	1.346 Ton-m	0.000 Ton-m	1.178 Ton-m	-3.862 Ton-m	2.684 Ton-m	0.000 Ton-m	4.105 Ton-m	-4.105 Ton-m	-7.053 Ton-m

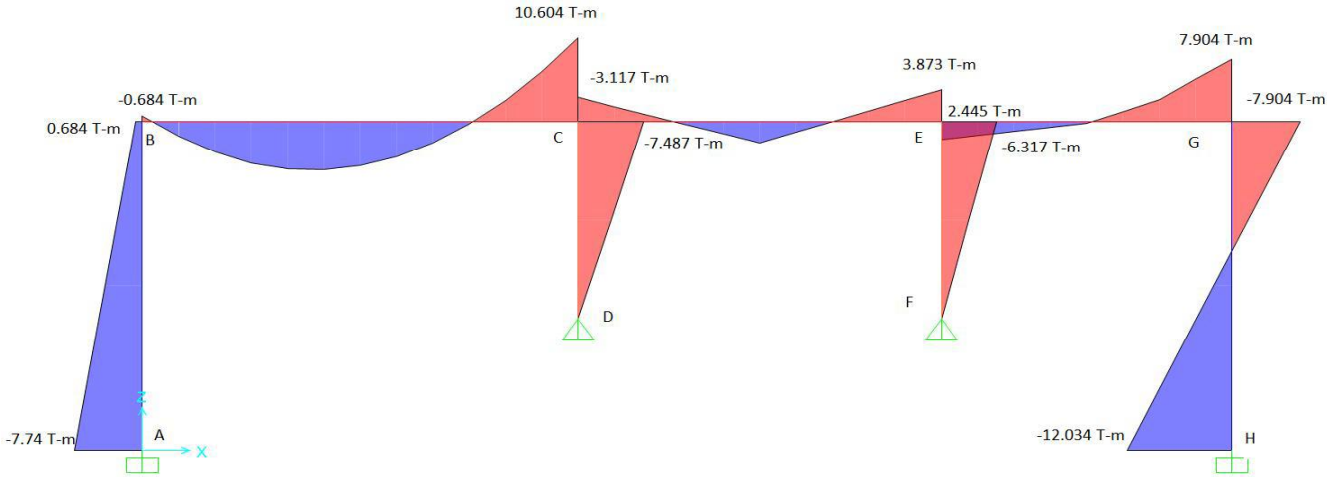
9) Reacciones en la base



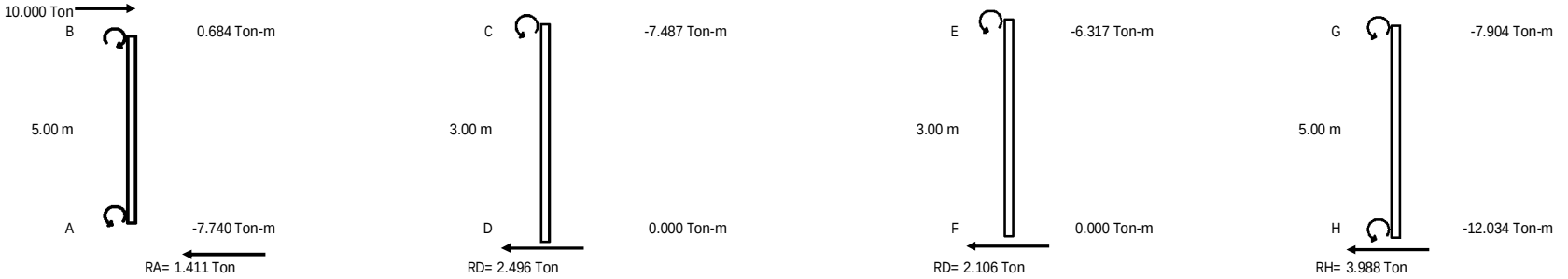
f=	6.689 Ton

10) Factor de corrección y momentos finales

					X=F/f=	1.61610959								
ELEMENTO	AB	BA	BC	CB	CD	CE	DC	EC	EF	EG	FE	GE	GH	HG
M. Finales	-7.740 Ton-m	0.684 Ton-m	-0.684 Ton-m	10.604 Ton-m	-7.487 Ton-m	-3.117 Ton-m	0.000 Ton-m	3.873 Ton-m	-6.317 Ton-m	2.445 Ton-m	0.000 Ton-m	7.904 Ton-m	-7.904 Ton-m	-12.034 Ton-m



11) Verificacion de equilibrio y momentos al centro



∑FH=	0.000