



Experiment No. 4

Doubly Constrained Gravity Model

October 30, 2021, 8:39 pm

Input Values :

Base Year Origin-Destination Cost Matrix			
Zone	1	2	3
1	3	10	15
2	10	5	10
3	15	10	5

Future Year Origins Total			
Zone	1	2	3
	10	15	8

Future Year Destinations Total			
--------------------------------	--	--	--



Zone	1	2	3
	7	16	10

Impedance Function used : Power function

$$[F_{ij} = C_{ij}^2]$$

Impedance Matrix Calculations (F_{ij})			
Zone	1	2	3
1	9	100	225
2	100	25	100
3	225	100	25

Selected Accuracy : Individual Cell



Entered Accuracy Level (i.e., percentage of error): 3 %

Iteration # 1

Calculations

i	j	Bj	Dj	F(Cij)	BjDjF(Cij)	SumBjDjF(Cij)	Ai
1	1	1	7	9	63	3913	0.0003
1	2	1	16	100	1600	3913	0.0003
1	3	1	10	225	2250	3913	0.0003
2	1	1	7	100	700	2100	0.0005
2	2	1	16	25	400	2100	0.0005
2	3	1	10	100	1000	2100	0.0005
3	1	1	7	225	1575	3425	0.0003
3	2	1	16	100	1600	3425	0.0003
3	3	1	10	25	250	3425	0.0003



Urban Transportation Systems Engineering Lab

by IIT Bombay - www.iitb.ac.in

i	j	A_i	O_i	$F(C_{ij})$	$A_i O_i F(C_{ij})$	$\sum A_i O_i F(C_{ij})$	B_j
1	1	0.0003	10	9	0.023	1.2628	0.7919
1	2	0.0003	15	100	0.7143	1.2628	1.4977
1	3	0.0003	8	225	0.5255	1.2628	0.742
2	1	0.0005	10	100	0.2556	0.6677	0.7919
2	2	0.0005	15	25	0.1786	0.6677	1.4977
2	3	0.0005	8	100	0.2336	0.6677	0.742
3	1	0.0003	10	225	0.575	1.3477	0.7919
3	2	0.0003	15	100	0.7143	1.3477	1.4977
3	3	0.0003	8	25	0.0584	1.3477	0.742

Origin-Destination Matrix [T_{ij}]

Zone	1	2	3	O_i	O_i'
1	0.1275	6.1239	4.2666	10	10.518



Urban Transportation Systems Engineering Lab

by IIT Bombay - www.iitb.ac.in

2	3.9594	4.279	5.3001	15	13.5385
3	2.9132	5.5971	0.4333	8	8.9436
Dj	7	16	10		
Dj'	7	16	10		

Iteration # 3

$[D_j][F_{ij}]$

i	j	Bj	Dj	F(Cij)	BjDjF(Cij)	SumBjDjF(Cij)	Ai
1	1	0.7784	7	9	49.0897	4129.8867	0.0002
1	2	1.5425	16	100	2462.4627	4129.8867	0.0002
1	3	0.7172	10	225	1618.3342	4129.8867	0.0002
2	1	0.7784	7	100	545.4415	1880.3168	0.0005
2	2	1.5425	16	25	615.6157	1880.3168	0.0005
2	3	0.7172	10	100	719.2597	1880.3168	0.0005
3	1	0.7784	7	225	1227.2433	3869.521	0.0003
3	2	1.5425	16	100	2462.4627	3869.521	0.0003



3	3	0.7172	10	25	179.8149	3869.521	0.0003
---	---	--------	----	----	----------	----------	--------

i	j	A_i	O_i	$F(C_{ij})$	$A_i O_i F(C_{ij})$	$\sum A_i O_i F(C_{ij})$	B_j
1	1	0.0002	10	9	0.0218	1.2847	0.7784
1	2	0.0002	15	100	0.7977	1.2847	1.5425
1	3	0.0002	8	225	0.4652	1.2847	0.7172
2	1	0.0005	10	100	0.2421	0.6483	0.7784
2	2	0.0005	15	25	0.1994	0.6483	1.5425
2	3	0.0005	8	100	0.2067	0.6483	0.7172
3	1	0.0003	10	225	0.5448	1.3942	0.7784
3	2	0.0003	15	100	0.7977	1.3942	1.5425
3	3	0.0003	8	25	0.0517	1.3942	0.7172

Origin-Destination Matrix $[T_{ij}]$



Urban Transportation Systems Engineering Lab

by IIT Bombay - www.iitb.ac.in

Zone	1	2	3	O _i	O _i '
1	0.1187	5.9758	3.9076	10	10.0021
2	4.3467	4.9219	5.7217	15	14.9903
3	2.5346	5.1023	0.3707	8	8.0076
D _j	7	16	10		
D _j '	7	16	10		

Current Iteration # 3