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Comparison of Different Structural Analysis Method using Continues Beam

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Abstract – *Normal methods for solutions of indeterminate continues beam involved difficult calculations. For design of any structure bending moment is a key parameter in this Slope deflection, Kani's , Moment Distribution used for analysis of the taken indeterminate continues beam. Conducted study shows value of bending moment in a above Slope deflection,*

Kani's, ,moment distribution nearly similar but MDM gives more accurate values.

Key Words **: Slope Deflection, Kani's, ,Moment Distribution**

1. INTRODUCTION

To design the structure it needs various parameters which obtained in the analytical part . These parameters are the shear force , bending moment , axial force ,deflection ,displacement & torsion , so for the determination of these Parameters various methods are being used .Bending moment is one of the parameter which is used mostly in the design purpose . All the calculation of material & geometry of structure are depend on the bending moment.Various methods are being used to calculate bending moment of the indeterminate structure. Sometimes it becomes tedious which method is preferable for the analysis of indeterminate structure.So in the present study the bending moment parameters has been taken which will be calculated by different structural analysis methods. These method is moment distribution method , slope deflection method , kani's method, stiffness method , matrix method.

PROBLEM STATEMENT

An continuous indeterminate beam has been taken as a problem for the study; the beam is of 8 meter span. The loading pattern is shown in the figure 1.

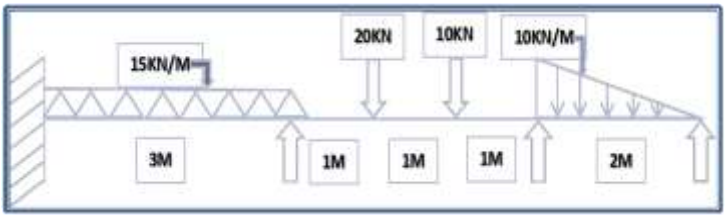


Figure: 1 Problem of beam structure

2. OBJECTIVES

Following are the main objectives of the study:

- Calculation of the bending moment by different structural analysis methods
- To determine the accuracy of the methods

3. METHODLOGY

Following three types of methods used for the analysis:

- Slope deflection method
- Moment Distribution method
- Kani's Method

So to analysis the above problem first we calculate the fixed end moment of the structure.

Following fixed end moment table is same for all the methods.

Table: 1 Fixed End moment

S.No.	Member	Fixed End Moment (kn-m)
1.	AB	-11.25
2.	BA	11.25
3.	BC	-11.11
4.	CB	8.8
5.	CD	-2
6.	DC	1.34

4.1 SLOPE DEFLECTION METHOD

In this method, joints are considered to be rigid The rotations of joints are treated as unknown. It involves the solution of a number of simultaneous equations connecting slope & moments of various joints of a beam .End moments are calculated using slope & deflection equation. The slope and deflections of the joints are actually found out, these enables us to sketch the deflected shape of the structure.

Following moments are obtained to analysis the problem by slope deflection method:-

Table: 2 End moments

S.No.	Member	Moment (kN-m)
1.	AB	-10.89
2.	BA	11.95
3.	BC	-11.95
4.	CB	6.14
5.	CD	-6.14
6.	DC	0.00

4.2 MOMENT DISTRIBUTION METHOD

This method provides a convenient means of analysing statically indeterminate beams & rigid frames. It is specially useful when the degree of redundancy is large & the other methods e.g. slope & deflection method entire the solution of a large number of simultaneous equations, which becomes very tedious. In MDM, numerical solution is performed in a tabular form. The process of moment distribution repeated for a number of cycles till the values obtained are within the desired accuracy.

Table: 3 Distribution factor

Joint	Member	Relative Stiffness	Total relative stiffness	Distribution factor
B	BA	4I/3	8I/3	½
	BC	4I/3		½
C	CB	4I/3	17I/6	8/17
	CD	3I/2		9/17

Table: 4 End moments by Moment distribution method

S.No.	Member	Moment (kN-m)
1.	AB	-10.92
2.	BA	11.94
3.	BC	-11.94
4.	CB	6.14
5.	CD	-6.14
6.	DC	0.00

4.3 KANI'S METHODS

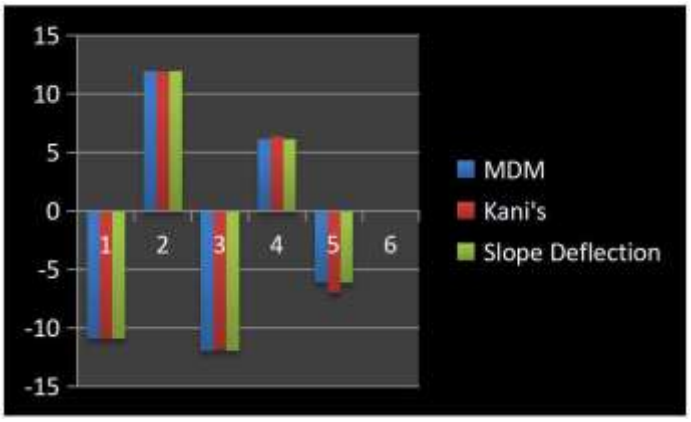
This Method is developed by Gasper kani. It is also called the rotation contribution method, is an approximate calculation method for indeterminate structures, particularly Portal frames & Multi-story Frames with Fixed connections. It is a much simpler & less time consuming method compared to Moment distribution method.

$M_{AB} = M_{FAB} + 2M'_{AB} + M'_{BA}$

S.No.	Member	Moment (kN-m)
1.	AB	-10.92
2.	BA	11.89
3.	BC	-11.85
4.	CB	6.33
5.	CD	-6.98
6.	DC	0.00

4. Result Comparison

Graph:



Here , this graph saws that analysis results of all methods are nearly same .

5. CONCLUSIONS

- The end moments of all methods were nearly same see from the graph.
- The result obtained from the Moment Distribution method are most accurate because of the number of the iterations are more comparatively.
- To analysis the problem by MDM method is quite preferable because Slope deflection method involve solving a more equation so it is quite tedious to solve the problem by these methods.

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