SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)
Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai
Accredited by NAAC-UGC with 'A++' Grade (Cycle III) &
Accredited by NBA (B.E - CSE, EEE, ECE, Mech & B.Tech.IT)
COIMBATORE-641 035, TAMIL NADU

DEPARTMENT OF AEROSPACE ENGINEERING

Faculty Name	:	**Dr.M.Subramanian, Prof & Head/ Aerospace**	Academic Year	:	**2024-2025 (Odd)**
Year & Branch	:	**III Aerospace**	Semester	:	**V**
Course	:	**19ASB302 – Finite Element Method for Aerospace**			
Unit:					

Weighted Residual Methods:

General Trial function:

$$u = a_0 + a_1 x + a_2 x^2 + a_3 x^3 + \ldots$$

Substitute the trial function in differential equation to get the residue function.

Point Collocation Method

$R(x) = 0$ $R(x) \rightarrow$ Residue function.

Here the point of x is between these limits, If the limit is 0 to 1

For two unknowns any two point between the sese limits. For example

x Value is 1/4 x value is 3/4

For three unknows any two point between those limits. For exame.

x value is 1/4 x value is 1/2

x Value is 3/4

Sub domain method:

$\int R(x) \cdot dx = 0$

Here the limit should be taken into two intervals. If the limit is 0 to 1

The limit varies between 0-0.5 $\int_{0}^{0.5} R(x)dx = 0$

The limit varies between 0.5-1 $\int_{0.5}^{1} R(x)dx = 1/2$

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Least Square Method:

$$\int R(x) \cdot \frac{\partial R}{\partial a_i} dx = 0 \qquad i = 0, 1, 2, 3 \ldots$$

Differentiate the R(x) with respect to a_1, a_2

Galerkin Method:

$$\int R(x) \cdot \phi(x) \cdot dx = 0$$

$\phi(x)$ → Weighting function

[Function associated with unknown trial function]

$$\phi(x) = \phi_0 + a_2\phi_1 + a_3\phi_2$$