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(71)**Name of Applicant :**
1)Prof. (Dr.) Anil Kumar
Address of Applicant :Professor, Department of Applied Sciences and Humanities, IMS Engineering College, Ghaziabad, Uttar Pradesh, India- 201015 ---------- ----------
2)Prof (Dr.) Vinai K. Singh
3)Dr. Vandana Yadav
4)Dr. Sudhir Singh
5)Dr. Vaibhav Kumar
6)Dr. Pradeep K Joshi
7)Dr. Amita Joshi
8)Dr. Rajan Singh
Name of Applicant : NA
Address of Applicant : NA
(72)**Name of Inventor :**
1)Prof. (Dr.) Anil Kumar
Address of Applicant :Professor, Department of Applied Sciences and Humanities, IMS Engineering College, Ghaziabad, Uttar Pradesh, India- 201015 ---------- ----------
2)Prof (Dr.) Vinai K. Singh
Address of Applicant :Department of Applied Science & Humanities, GL Bajaj Group of Institutions, Mathura, Uttar Pradesh, India-281406 ---------- ----------
3)Dr. Vandana Yadav
Address of Applicant :Assistant Professor, Department of Computer Science & Engineering, Brainware University, Barasat, Kolkata- 7000125 ---------- ----------
4)Dr. Sudhir Singh
Address of Applicant :Associate Professor, Department of Applied Science, KCC Institute of Technology and Management, Greater Noida, Utter Pradesh, India - 201306 ---------- ----------
5)Dr. Vaibhav Kumar
Address of Applicant :Associate Professor, Department of Applied Science, KCC Institute of Technology and Management, Greater Noida, Utter Pradesh, India - 201306 ---------- ----------
6)Dr. Pradeep K Joshi
Address of Applicant :Professor, Department of Mathematics, IPS Academy, Indore, Madhya Pradesh, India- 452012 ---------- ----------
7)Dr. Amita Joshi
Address of Applicant :Assistant Professor, Department of Mathematics, IPS Academy, Indore, Madhya Pradesh, India- 452012 ---------- ----------
8)Dr. Rajan Singh
Address of Applicant :Associate Professor, Department of Mathematics, School of Sciences, IFTM University, Moradabad-244102, Uttar Pradesh, India ---------- ----------

(57) Abstract :
The present invention relates to a computer-implemented system and method for solving partial differential equations (PDEs) using the Finite Element Method (FEM) based on Galerkin's technique. The invention automates the symbolic derivation of weak formulations from user-defined PDEs, generates finite element meshes, assembles global matrix systems, and computes numerical solutions using efficient solvers. It supports adaptive mesh refinement based on error estimation to enhance solution accuracy while optimizing computational resources. The system handles various types of PDEs, boundary conditions, and element geometries, providing a flexible and extensible framework for accurate and efficient simulation of complex physical phenomena in engineering and scientific applications. Accompanied Drawing [FIGS. 1-2]

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