(12) PATENT APPLICATION PUBLICATION
(19) INDIA
(22) Date of filing of Application :18/06/2024

(21) Application No.202441046933 A
(43) Publication Date : 21/06/2024

(54) Title of the invention : HYBRID NUMERICAL METHOD FOR SOLVING PARTIAL DIFFERENTIAL EQUATIONS IN COMPUTATIONAL FLUID DYNAMICS

(51) International classification	:G06F0030230000, G06F0111100000, G01V0099000000, G06F0017130000, G06F0030200000
(86) International Application No Filing Date	:NA :NA
(87) International Publication No	: NA
(61) Patent of Addition to Application Number Filing Date	:NA :NA
(62) Divisional to Application Number Filing Date	:NA :NA

(71)**Name of Applicant :**
1)Mr. B.P.R.V.S. Priyatham
Address of Applicant :Assistant Professor, Department of Civil Engineering, GMR Institute of Technology (A), Rajam, Andhra Pradesh, India, Pincode: 532127 ---------- ----------
2)Dr. G. Prasanna Kumar
3)Mr. D.V.S.R.K.Chaitanya
4)Mr. Krupasindhu Biswal
5)Mr. P. Manoj Kumar
6)Mr. P. Siva Kumar
7)Mr. M.T.S. Lakshmayya
8)Mr. B. Manikanta
Name of Applicant : NA
Address of Applicant : NA
(72)**Name of Inventor :**
1)Mr. B.P.R.V.S. Priyatham
Address of Applicant :Assistant Professor, Department of Civil Engineering, GMR Institute of Technology (A), Rajam, Andhra Pradesh, India, Pincode: 532127 ---------- ----------
2)Dr. G. Prasanna Kumar
Address of Applicant :Assistant Professor, Department of Civil Engineering, Aditya Institute of Technology and Management (A), Tekkali, Andhra Pradesh, India, Pincode: 532201 ---------- ----------
3)Mr. D.V.S.R.K.Chaitanya
Address of Applicant :Assistant Professor, Department of Civil Engineering, Acharya Nagarjuna University College of Engineering, Guntur, Andhra Pradesh, India, Pincode: 522510 ---------- ----------
4)Mr. Krupasindhu Biswal
Address of Applicant :Assistant Professor, Department of Civil Engineering, Aditya Institute of Technology and Management (A), Tekkali, Andhra Pradesh, India, Pincode: 532201 ---------- ----------
5)Mr. P. Manoj Kumar
Address of Applicant :Assistant Professor, Department of Civil Engineering, Raghu Engineering College (A), Dakamarri (V), Visakhapatnam, Andhra Pradesh, India, Pincode: 531162 ---------- ----------
6)Mr. P. Siva Kumar
Address of Applicant :Assistant Professor, Department of Civil Engineering, Raghu Engineering College (A), Dakamarri (V), Visakhapatnam, Andhra Pradesh, India, Pincode: 531162 ---------- ----------
7)Mr. M.T.S. Lakshmayya
Address of Applicant :Assistant Professor, Department of Civil Engineering, Raghu Engineering College (A), Dakamarri (V), Visakhapatnam, Andhra Pradesh, India, Pincode: 531162 ---------- ----------
8)Mr. B. Manikanta
Address of Applicant :Assistant Professor, Department of Civil Engineering, Aditya University, Surampalem, Kakinada, Andhra Pradesh, India, Pincode: 533437 ---------- ----------

(57) Abstract :
The proposed invention introduces a hybrid numerical method for solving partial differential equations in computational fluid dynamics (CFD), combining the strengths of Finite Element Method (FEM), Finite Volume Method (FVM), and spectral methods. This integration enhances accuracy, stability, and computational efficiency by addressing the limitations of traditional methods. The hybrid approach employs adaptive mesh refinement, advanced preconditioning, and turbulence modeling, ensuring high fidelity in complex simulations. It incorporates techniques for handling moving boundaries, multi-phase flows, and reactive flows, making it versatile for diverse applications. Implemented within a user-friendly software framework, the method is scalable for high-performance computing, facilitating efficient large-scale simulations. This innovative approach offers a powerful tool for engineers and researchers, enabling precise and reliable CFD analyses across various fields.

No. of Pages : 28 No. of Claims : 10