

I-STEM Software Request - Guide Approval Form

User Details

- **Name of Researcher:** ROHAN SENTHIL KUMAR
- **User Type:** ☐ Ph.D. Scholar ☐ Postdoctoral Researcher ☐ Bachelor's ☒ Masters
- **Institution Name** : Lovely Professional University
- **Institutional Contact No:** 01824506100
- **Research Topic:** advanced aerodynamics

Software Request Details

- **Software Name:** Basic + Advanced Modules
- **Justification for Software Request:**

My research focuses on the application of advanced computational modeling and simulation tools in the field of Aerospace Engineering, with emphasis on multiphysics analysis relevant to aerospace structures, propulsion systems, and fluid-structure interactions. Specifically, COMSOL Multiphysics will be utilized for the following domains of investigation:

1. **Aero-Structural Analysis** – Modeling and simulation of aerospace structural components such as wings, fuselage panels, and turbine blades under aerodynamic loading, including stress-strain response, vibration characteristics, and fatigue life estimation.
2. **Fluid Dynamics & Aerodynamics** – Computational study of external and internal aerodynamics, including laminar-turbulent transition, flow separation, and heat transfer in aerospace components. Coupled CFD simulations will be carried out to predict aerodynamic efficiency and flow stability for design optimization.
3. **Multiphysics Coupling for Aerospace Systems** – Integration of fluid flow, thermal, and structural effects to study coupled phenomena such as aeroelastic flutter, thermal stresses in high-speed flight, and conjugate heat transfer in propulsion systems.
4. **Propulsion and High-Temperature Materials** – Simulation of combustion chamber heat transfer, nozzle flow, and thermal barrier coating effectiveness under extreme aerospace operating conditions. Analysis will also include thermo-mechanical stresses in materials subjected to hypersonic regimes.
5. **Novel Aerospace Materials and Composites** – Investigation of advanced composite materials, including carbon-fiber reinforced polymers, for aerospace structural applications, focusing on anisotropic material behavior, impact resistance, and failure mechanisms.

This research aims to integrate multiphysics simulation into the design, analysis, and optimization of aerospace systems, thereby improving safety, efficiency, and sustainability of future aerospace technologies. The results will support my M.Tech research work and contribute to ongoing projects in the domain of aerospace structures, aerodynamics, and propulsion.

Guide/Supervisor Approval

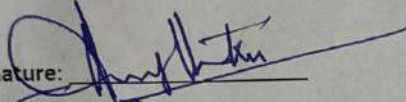
I, Dr. Amit Malik

(Guide/Supervisor Name),

- Confirm that the above-mentioned researcher is affiliated with our institution
- Have reviewed the software request and its relevance to the researcher's academic work
- Approve the software request for research purposes

Approval Confirmation

- I approve the software request
- The software aligns with the researcher's research objectives
- The request meets the institutional research guidelines

Guide/Supervisor Signature: 

Date: 29/8/2024

Lovely Professional University
Phagwara (Punjab)

Important Notes

1. This form must be signed and scanned
2. The scanned copy must be uploaded with the software request
3. Electronic signatures are acceptable if from an official institutional email