

I-STEM Software Request - Guide Approval Form

User Details

- Name of Researcher: Abhishat Badamali
- User Type: ☐ Ph.D. Scholar ☐ Postdoctoral Researcher ☐ Bachelor's ☒ Masters
- Institution Name: RAJENDRA UNIVERSITY
- Institutional Contact No: 9794721935
- Research Topic: Design of Metamaterial Absorbers

Software Request Details

- Software Name: COMSOL Multiphysics, RF and wave optics Module
- Justification for Software Request: [Provide detailed explanation of how the software supports your research objectives]

Guide/Supervisor Approval

I, Dr. Jitenbra Kumar Pradhan
(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: Dr. Jitenbra Kumar Pradhan

Date: 29-7-2026 Asst. Professor of Physics
Rajendra University
Balangir

Official Stamp/Seal: [Space for Institutional Stamp]

Important Notes

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

JUSTIFICATION FOR SOFTWARE REQUEST

Our research involves design and fabrication of band selective metamaterial absorber/emitter for infrared wavelengths (2 micrometer to 14 micrometer). This region of infrared radiation is particularly useful for military and civilian applications such as thermal camouflage and passive radiative cooling. We aim to design metamaterial perfect emitters for thermal camouflage application. Thermal Camouflage is technique by which the thermal signature of objects can be concealed from the infrared detectors. Metamaterial are artificially designed materials with sub-wavelength unit cell, exhibits properties that are unavailable with natural occurring materials. Perfect absorption/emission is one such characteristics exhibited by metamaterials that can be useful for many civilian and military applications. Our focus is to design metamaterial with tunable/flexible emission which can be controlled with external means such as heat, electric field and laser etc. With tunable emissivity with properly designed metamaterial structure, the thermal emissivity of an object can be manipulated as per requirement.

Here, we will design metamaterials with structure that are of sub-micrometer in size. Before going for fabrication, we aim to simulate the optical properties of these micrometer sized resonators. We will also like to see the near field properties when infrared light interacts with the sub-wavelength sized structures. Particularly, how the electric field and magnetic fields are confined with each layer and structures. As, these design involve micro or nano-meter sized structures, a numerical simulation is required.

We belong to a public state University (Rajendra University, Balangir, Odisha) which is situated at the backward area of the state, which is having minimal resources and academic vigor. We don't have financial support to procure COMSOL software from the market. We would like to use the facility from I-STEM portal, which is an initiative from the Govt. of India, to strengthen the research culture in state Universities like us.