January 21, 2021

Dear Professor,

I am writing to apply for the post of Project Assistant position in the FLAME lab at CDS, IISc. Advertisement No: CDS/KA/SERB-SRG/DEC2020/PA. I am a mechanical engineer by training and have gained expertise in computational techniques through undergraduate and master's thesis projects. I learned the first lessons on computational analysis during my undergraduate college years through my project and as a course in C and Data Structures. I learned MATLAB programming during my M.Tech thesis. I was first introduced to Finite Element Method (FEM) during my undergraduate course and also took up a course as a part of my M.Tech program. This course helped me to take up challenging problems for my thesis. I used FEM methods, as provided by COMSOL multiphysics, combined with a MATLAB program for LASER induced photon distribution for studying thermally induced tissue damage. The project convinced me that fundamental mechanical engineering equations, such as that governing heat diffusion are used in multidisciplinary fields, such as the bioheat equation for temperature distribution in tissues. During my many years of teaching experience, I ensured that my knowledge of numerical techniques are advanced and kept updated.

I gained experience in implementing numerical techniques using Python programming. Python, compared to MATLAB, offered a fast but easy alternative to pursue programming in numerical techniques. A course in Computational Fluid Dynamics (CFD) provided by IIT Madras through NPTEL during my teaching career broadened my knowledge of numerical methods in fluid dynamics.

I am an ardent learner of computational techniques, in which CFD grabs my attention. This is because of the intensive mathematical modeling fluid flow research demands. I am interested in mathematical modeling approaches such as those employed in dynamical system theory. In general, I would like to pursue a research career in which I am exposed to challenging mathematical modeling problems alongside the development of computational codes to solve them. I know that the ability to read a mathematical equation, understanding what each term of a PDE represents, and the contribution of those terms in describing the natural phenomenon are foundation stones of computational practice. Mathematical skills in transforming PDEs to a set of algebraic equations and choosing an appropriate solver have given me the confidence to take up challenging problems. I am confident that I will be able to contribute my best to your research team and also will be able to advance my knowledge in computational techniques.

I would appreciate it if granted the opportunity to work with your team. I am looking forward to a discussion with your team.

Thank you,
Shilpa Francis