

April 26, 2022

Dear Prof. Carlo Fiorina,

I am a PhD scholar working under the guidance of Prof. A. John Arul, Homi Bhabha National Institute (HBNI), Indira Gandhi Centre for Atomic Research, India. I plan to submit my Ph.D. thesis in December, 2022.

I have carried out my Ph.D. in severe accident analysis with prime focus on development of mechanistic model for the source term problem under severe accident conditions for an SFR. The work performed was part of IAEA CRP on "Radioactive Release from the Prototype Sodium cooled Fast Reactor under Severe Accident Conditions". During my Ph.D. tenure, I have developed/used both Python based tools and modified OpenFOAM based solvers to analyze in-vessel, interface and in-containment source term. For in-vessel assessment, I have developed two tools namely i) percolation based mechanistic model to determine fission gas release & pool scrubbing model and ii) thermo-chemical equilibrium approach based tool MINICHEM to determine RN release to cover gas. The fission gas release model would be not only helpful to determine gap release under accident conditions, but would be helpful to characterize or locate failed fuel elements during reactor operation. The developed tool was also used to specify allowable number of failed fuel elements during reactor operation for Prototype Fast Breeder Reactor (PFBR). MINICHEM is python based tool to analyze RN release to cover gas which is hosted [GitHub](#).

For the interface and in-containment source term analysis, where the dynamics of aerosol evolution and release are of importance, I have developed a python based tool with a capability to analyze the aerosol evolution with time. This tool is available as an open source at [GitHub](#). Further, by utilizing the capability of OpenFOAM, I have performed 3D simulations for the cover gas and containment facilities (scaled experimental facilities) in order to have better understanding of aerosol evolution during accident conditions (using aerosolEulerFoam).

I am extremely eager to pursue a post-doctoral research on challenging problems towards development of multiscale and multiphysics simulation for future generation reactors and related research topics. My formal training, academic background and research experience should permit me to carry out work in research problem related to safety analysis. My research interest matches with the work being carried out in your research group on development of multiphysics solver for the estimation of the fission gas release from the fuel elements. I would like to work on research problems related to development of 3-D fuel performance code using OpenFOAM. As an aspiring researcher I would assure that I will give my best and strive to provide innovative solutions to the tasks given to me and work hard in order to prove my self worthy.

I will be happy to provide you with any additional information that is necessary to support my application. Looking forward to hearing from you.

Sincerely,



Parthkumar Rajendrabhai Patel