San José State University Research Foundation

Position: Postdoctoral Research Associate: Thermal-Degradation and Emission Factor Modeling

DEPARTMENT:	Mechanical Engineering Department
IMMEDIATE SUPERVISOR:	Project Director
POSTING DATE:	March 20, 2023
CLOSING DATE:	Until Filled
SALARY:	$75,000-$80,000 annually, DOQ/E
EXEMPT STATUS:	Exempt, Full-Time, Benefited

GENERAL NATURE OF POSITION

The Thermo-Fluids Complexity Lab (TFX Lab) and the Wildfire Interdisciplinary Research Center (WIRC) at San José State University (SJSU) seek applicants for a *postdoctoral research associate* position focusing on thermal-degradation and emission factor modeling with applications in wildfires.

The goal of the position is to implement mathematical methods to account for the contribution of spot fire ignition in the rate of spread of wildfires and improve the emission estimates in the large-scale coupled fire-atmosphere models. The successful applicant will deploy their domain knowledge in mathematics and fire (combustions) science to develop physics-based models for (1) simulating spot fire ignition caused by firebrands, and (2) enabling a multilayer fuel characterization for the purpose of fire emission computations and transferring the computation results to large scales. The position requires a strong background in thermal-degradation modeling, pyrolysis and gasification, expertise in mathematical modeling of biomass pyrolysis and/or reacting flows, and familiarity with coupled fire-weather models, in particular WRF-SFIRE and/or WRF-SFIRE-CHEM. The successful candidate will work approximately two-thirds of their time on spot fire ignition and the remaining time on emission characterization and improvements of fire spread representation in WRF-SFIRE. The new methods and algorithms developed by this project will have to be integrated into the existing fire forecasting system at SJSU.

The ideal candidate will have a strong background in fluid and fire dynamics, experience in biomass thermal-degradation modeling, and extensive experience in Computational Fluid Dynamics (CFD). Strong programming skills and experience with programming/scripting languages such as FORTRAN and Python/Julia are required. Familiarity with C/C++, CUDA is a plus.

The position is part of the new Wildfire Interdisciplinary Research Center (WIRC) at SJSU, and the candidate will regularly interact with other scientists within the WIRC. The position is available for one year and can potentially be extended for an additional year based on satisfactory performance in the first year and funding availability. WIRC at SJSU is dedicated to advancing the state of wildfire science through interdisciplinary research targeted at the needs of industry partners such as the Forest Service, utility companies, the insurance industry, and national labs. The research projects conducted at WIRC aim at

integrating new research into operational applications by extending scientific knowledge and building new tools.

ESSENTIAL DUTIES & RESPONSIBILITIES

1. The development of new physical-based modules for simulation and parameterization of the spot fire ignition caused by firebrand accumulation over different recipient surfaces.

2. Scaling the results and findings from simulations to large-scale models.

3. Implementing a new framework for improving the emission estimates in a coupled fire-atmosphere model.

4. Evaluation, testing, analysis, and visualization of the results from the developed models. The candidate is expected to conduct high-quality research resulting in peer-reviewed publications.

5. Communicating and coordinating with the principal investigator on the status of the research and development efforts related to the projects.

6. Working with other WIRC scientists and collaborators to support various wildfire projects funded by federal, state, and private organizations.

7. Developing manuscripts for publication in peer-reviewed scientific literature (e.g., peer-reviewed journals, books, etc.). Assist in preparing and reviewing of research grants.

8. Developing relationships with fellow researchers that will enhance the Fire Modeling program at the Wildfire Interdisciplinary Research Center.

INTERPERSONAL CONTACTS

1) Reports to the project director.
2) Frequently interacts with other WIRC scientists and collaborators to support various wildlife projects.
3) Candidate will benefit from enterprise-level projects, along with exposure and interaction with wildfire stakeholders in different industry verticals.

SUPERVISORY RESPONSIBILITIES

None.

QUALIFICATIONS

Education and Experience

- Ph.D. degree in mechanical, chemical, or aerospace engineering, atmospheric science, or other relevant fields such as computational sciences.
- Expertise in Computational Fluid Mechanics (CFD), in particular experience in modeling thermal-degradation using coupled CFD models, such as OpenFOAM or FDS.
- Familiarity or experience utilizing coupled fire-atmosphere models such as WRF-SFIRE and/or WRF-SFIRE-CHEM.

Knowledge, Skills, Abilities Required
- Excellent programming expertise in FORTRAN and Python.
  - Familiarity with C/C++, CUDA, or Julia is a plus.
- Strong communication and organizational skills.
- Ability to independently write/edit manuscripts for peer-reviewed publications.
- Working knowledge of various scientific data types and formats such as NetCDF and HDF5 files.
- Applicants will be evaluated based on experiences and satisfactory references regarding work habits, professionalism, and attitude. We encourage applicants of varying backgrounds to apply.

Complexity of Duties
- Computer and data analysis.

NOTE: This position description intends to describe the general nature and level of work being performed by people assigned to this job. It is not intended to include all duties and responsibilities. The order in which duties and responsibilities are listed is not significant.
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BENEFITS

The San José State University Research Foundation (SJSURF) provides an excellent benefits package to benefited employees. **The comprehensive benefits package includes:**

a) Four company health insurance plans to choose from (employee contributions differ according to plan and level of coverage).
b) Employer-paid dental and vision for both employee and eligible dependents.
c) Life, AD&D, LTD with supplemental coverage opportunities.
d) 14 paid federal & state holidays.
e) Retirement Plan: 403 (b) employee contribution plan component and a 403 (b) employer contribution component, which vests immediately.
f) Vacation-hour accruals and separate sick-hour accumulations.
g) Employee discounts.

Please visit the [Benefits & Compensation page](#) on the SJSURF website for more detailed information.

COVID-19 VACCINATION POLICY
As required by the CSU Vaccination Policy, all new hires must be fully vaccinated against COVID-19 starting on September 30, 2021. Fully vaccinated means it has been 14 days after the second dose of the Pfizer or Moderna vaccine has been given, or it has been 14 days after the one dose of the J&J vaccine has been given. Additionally, all employees are required to have booster shots and provide proof to SJSU by 2/28/2022 or after six months from the final dose of the original vaccination, whichever is later. Proof of being fully vaccinated does not need to be disclosed until a job offer has been made, and proof must be submitted after the acceptance of the job offer. New hires may request a reasonable accommodation of the COVID-19 vaccination requirement based on medical or religious reasons. New hires must submit their request for an accommodation form after they accept the job offer, and before their scheduled start date. The reasonable accommodation provided to the employee, if any, will depend on the employee's job and the applicable facts, but it may include weekly COVID-19 testing. New hires who do not submit, before

their scheduled start date, proof of being fully vaccinated or a request for reasonable accommodation will have their job offer revoked.

APPLICATION PROCEDURE

To apply for this position, an applicant must submit a formal application for employment, as well as a resume, and a cover letter. The formal employment application is located on the SJSURF website on the **Forms page. All candidates must submit their application materials to foundation-jobs@sjsu.edu. Please add PD RA to the subject line of the email.**

A background check (including a criminal records check) must be completed satisfactorily before any candidate can be offered a position with the SJSURF. Failure to satisfactorily complete the background check may affect the application status of applicants or the continued employment of current SJSURF employees who apply for the position.

REASONABLE ACCOMMODATION

SJSURF is committed to providing access, equal opportunity, and reasonable accommodation for individuals with physical or mental disabilities in the employment, recruitment, examination, interviewing, and hiring processes. If you are a job seeker with a physical or mental disability and require a reasonable accommodation to search, apply, or interview for a job opening or otherwise need a reasonable accommodation during the application and hiring process, please contact us at foundation-jobs@sjsu.edu. In the email message, please indicate your full name, phone number and the type of assistance required. You must not reveal the underlying medical reason for your needed reasonable accommodation or otherwise disclose confidential medical information.

ABOUT THE SJSU RESEARCH FOUNDATION

SJSURF employment is separate and distinct from San José State University or the state of California employment. SJSURF employees are not employees of SJSU or of the state of California.

SJSURF is a non-profit auxiliary of San José State University. SJSURF is totally self-supported. The majority of the organization's funding comes from the federal government, and other public and private entities. With annual revenues totaling over $65 million, programs managed through SJSURF cover a rich diversity of applied research, public services, and educational-related activities.

SJSURF is an equal opportunity employer and does not discriminate on the basis of race, color, creed, gender, religion, marital status, registered domestic partner status, age, national origin, ancestry, physical or mental disability, medical condition, sex, genetic information, sexual orientation, military and veteran status or any other consideration made unlawful by federal, state, or local laws. It also prohibits unlawful discrimination based on the perception that anyone has any of those characteristics, or is associated with a person who has or is perceived as having any of those characteristics.

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