

Curriculum Vitae

Rohit Sanjay Khare

PERSONAL DATA

ADDRESS: #115, Thermodynamics and Combustion Engg. Laboratory, Department of Mechanical Engg., IIT Madras.
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EDUCATION

JAN 2016–PRESENT CURRENTLY PURSUING M.S. in MECHANICAL ENGINEERING, **IIT Madras**, Chennai.
Thesis: “A comprehensively validated compact mechanism for dimethyl ether oxidation: an experimental and computational study”
Advisors: Dr. Krithika Narayanaswamy and Dr. V. Raghavan
CGPA: 8.8/10

JULY 2011–JULY 2015 B.Tech., MECHANICAL ENGINEERING
Vishwakarma Institute of Technology, Pune.
(Affiliated to Pune University, Pune.)
CGPA: 8.87/10

PUBLICATIONS

CONFERENCE PROCEEDINGS

1. **Rohit Sanjay Khare**, V. Raghavan, Krithika Narayanaswamy, “*A Chemical Kinetic Modeling Study of the Effects of Oxygenated Species on Soot Emissions from Diesel Engines*”, Proceedings of the International Conference on Sustainable Energy and Environmental Challenges, 2017.

CONFERENCE

1. **Rohit Sanjay Khare**, Krithika Narayanaswamy, V. Raghavan, “*Study of Auto-Ignition and Extinction Characteristics of Diesel Blended with Oxygenates in Laminar Opposed Non-Premixed Flames*”, 10th U.S. National Combustion Meeting Organized by the Eastern States Section of the Combustion Institute, April 23–26, 2017, College Park, Maryland.
2. Martin Hunyadi-Gall, Gerald Mairinger, **Rohit Sanjay Khare**, Krithika Narayanaswamy, V. Raghavan, Kalyanasundaram Seshadri, “*The Influence of Stoichiometric Mixture Fraction on Extinction of Laminar, Non-premixed DME Flames*”, 10th U.S. National Combustion Meeting Organized by the Eastern States Section of the Combustion Institute, April 23–26, 2017, College Park, Maryland.

MANUSCRIPTS UNDER REVIEW

1. **Rohit Sanjay Khare**, Senthil Kumar P., V. Raghavan, Krithika Narayanaswamy, “*A*

comprehensively validated compact mechanism for dimethyl ether oxidation: an experimental and computational study", Combustion and Flame, 2018 (under review).

2. Gerald Mairinger, **Rohit Sanjay Khare**, Krithika Narayanaswamy, Martin Hunyadi-Gall, Vasudevan Raghavan, Kalyanasundaram Seshadri, "*Experimental and computational investigation of the influence of stoichiometric mixture fraction on structure and extinction of laminar, nonpremixed methoxymethane flames*", Combustion Theory and Modelling, 2018 (under review).

HONORS AND AWARDS

MARCH 2015 Graduate Aptitude Test in Engineering (GATE 2015): Achieved a score of 566 and stood among the top 5% of the total candidates appeared.

APRIL 2014–2015 Best Player Award in Inter Engineering Kaware Cricket Tournament.

INTERNSHIP AND SCHOLARSHIP

JUNE 2014–JULY 2014 Internship in Volkswagen India Pvt. Ltd.

JAN 2016–PRESENT Half Time Research Assistance (HTRA) Scholarship

RESEARCH EXPERIENCE

- **A Chemical Kinetic Modeling Study of the Effects of Oxygenated Species on Soot Emissions from Diesel Engines**

The role of oxygenated hydrocarbons (methanol and DME) in reducing soot precursors from diesel engines has been studied using a detailed chemical kinetic model. Diesel has been represented by a surrogate made of *n*-dodecane and *m*-xylene, whose composition is defined to match the threshold sooting index of the real fuel. Our analysis revealed that oxygenates decreased the overall equivalence ratio of the mixture thus producing higher ignition temperatures and more radical species to consume more soot precursor species, leading to lower soot production overall. These observations were exemplified by a fundamental path flux analysis of the production and consumption routes of acetylene, which is the dominant soot precursor in this case.

- **Study of Auto-Ignition and Extinction Characteristics of Diesel Blended with Oxygenates in Laminar Opposed Non-Premixed Flames**

Autoignition and extinction characteristics of mixtures of diesel surrogate (mixture of *n*-dodecane and *m*-xylene) and oxygenated additives (methanol and DME) have been computed. The results indicated that blending small amounts of oxygenates with diesel increases its resistance to extinction whereas, the auto-ignition characteristics were not altered much due to blending. This study suggests that in the presence of an oxygenate, a combustion system can be made more stable even at higher strain rates while operating with reduced emissions.

- **Experiments in Counterflow Diffusion Flames**

Experiments were performed to obtain the extinction strain rates of DME/air mixtures in a counterflow burner setup at NCCRD, IIT Madras. DME being a highly flammable gas, the setup has been modified in order to obtain extinction data for DME. The strain rate at extinction has been measured as a function of the mass fraction of fuel in the fuel stream. The results obtained have been validated using detailed chemical kinetic model and found to agree well with the experimental data.

- **A Skeletal Mechanism for Dimethyl Ether Oxidation**

A skeletal mechanism consisting of 23 species and 88 elementary reactions has been proposed for DME oxidation. The predictions of the skeletal mechanism agree very

well with the available experimental data for ignition delay, laminar flame speeds, flow reactor and jet-stirred reactor (JSR) species profiles, and non-premixed extinction strain rates. The skeletal mechanism has been further reduced by introducing quasi-steady state assumptions for six intermediate species to obtain a 14-step global mechanism using a reduction code developed in-house. The reduced mechanism performs as good as the skeletal mechanism for all the experimental data sets it has been tested for.

- **Cricket Bat Seasoning Machine**

A fully automated cricket bat seasoning machine has been designed and fabricated as a part of my final year B.Tech project. A new cricket bat needs proper seasoning to compress its fibres which provides strength to the bat to sustain the impact from the cricket ball. The performance and effectiveness of the machine has been tested thoroughly. We are in the final stages of applying for a patent.

TEACHING

- Teaching assistant for “Fundamentals of Combustion ME6060” (IIT Madras, Jul-Nov 2017) .
- Teaching assistant for “Thermal and Energy Laboratory Experiments” (IIT Madras, Jan-May 2017).

COURSES

M.S., Mechanical Engineering, IIT Madras

- Combustion Technology
- Theoretical and kinetics aspects of combustion (GIAN course)
- Theory of fire propagation
- Incompressible fluid flow
- Applied Thermodynamics
- Measurements in thermal engineering
- Numerical methods in thermal engineering

Co-CURRICULAR ACTIVITIES

- Represented Vidarbha (Maharashtra, India) in the Under-16 Poly Umriger Cricket Tournament held at Kanpur during the season 2008–09. The above tournament having a national level status was conducted under the aegis of the Board of Control for Cricket in India.
- Successfully completed 30th Pune International Half Marathon 2015 with a net time of 1:48:05.

SKILLS

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| Laboratory Skills: | Operation of counterflow diffusion burner |
| Computational Software: | FlameMaster, MATLAB and CATIA |
| Computer Language: | C, C++, Java and Perl |