MCEC Promotions

Aditya Sengar:

Stochastic approaches for study of nonlinear chemical reactions
and mass transfer in catalytic reactors

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"There were quite a few instances I should have been surprised about the
result, but being a young PhD student, I did not realize the magnitude of those
discoveries." – *Aditya Sengar*

Could you tell us a little more about your dissertation?
My dissertation work consists of two different parts. For the first part, we have created a
mesoscale multicomponent fluid model which can be used to simulate heterogenous
chemical reactions. For the second part, we used microkinetic modeling to develop a theory
for the catalyst deactivation in the alkylation reaction to generate higher carbon-number
fuels.

What, to you, is the most surprising result from your research?
Now that I think about it, there were quite a few instances I should have been surprised
about, but being a young PhD student, I did not realize the magnitude of those discoveries.

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However, these things now reinforce the fact that accepting something new is not an easy process. For me, a recent incident occurred when we were simulating deactivation catalyst in a reactor with flow and we observed a slowly moving deactivation zone along the reactor length. We first outright rejected the idea and blamed the simulations, but upon lateral analysis we found that such peculiar behavior is the reason why the specific reaction is unfit under flow plug flow conditions.

How do you look back on your time as a MCEC PhD?
Being a part of the Team Community, and the Student Representative team, I got to learn the different aspects a big project consortium. I enjoyed conversations with people with varied background and saw those conversations evolve as the interactions matured. Also, the small friend circle I was able to create outside my own university is something I will cherish always.

Is self-motivation still your biggest motivation? *(See [this interview](#) with Aditya in the MCEC internal newsletter, 2017.)*
Self-motivation had been one of my greatest sources of motivation for the first couple of years as a PhD student. Towards the later years, thing changed a bit. Working with Rutger, I saw a peaking interest in him about the work, and this further fueled my desire to produce quality work that also fulfills him. I would call this drawing motivation purely by interacting positively about your work with someone.

In the same interview, you mention that after your PhD, you would like to "work on a more fundamental topic as a PostDoc, to get an estimate of how different applied and fundamental studies vary." Is that still the case?
Yes, after my PhD, I am planning to expand my skill set as a computational scientist and dive into the biophysics side of mesoscale processes. I have come to the agreement that my life and skills are based as a problem solver. I would still not call myself faithful to a certain discipline or science (one of the other reasons I enjoyed working in a multi-disciplinary environment in MCEC). In order to expand the scopes of problems I can solve, I would like to see more about the world from different scientific perspectives.