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Editorial

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There have been several journals that have dedicated issues to honor Prof. K. R. Rajagopal. His biography and all his vast accomplishments have been thoroughly documented by many well known scholars in mechanics. We will not repeat them here, instead pointing to the editorials journals such as the International Journal of Engineering Science 18(11) 2011, Mathematical Models & Methods in Applied Sciences 21(1), 2011, Applications of Mathematics (Institute of Mathematics, Academy of Sciences of the Czech Republic), Vol 56(1), 2011. We are a ``young" journal and both the Editors in Chief were mentored by Prof Rajagopal. So this editorial is more personal ; I would like to talk about Rajagopal, the researcher and person.

I first met Prof. Rajagopal when he visited Berkeley in the 1990s. I was a post doctoral fellow working with Prof P.M. Naghdi and went to listen to Prof. Rajagopal talk about multinetwork theories. I still remember the long argument that ensued and one of Prof. Rajagopal's memorable quotes "people think they are thinking when they are merely rearranging their prejudices". Subsequently, Prof. Naghdi advised me to apply to the University of Pittsburgh and told me "continuum mechanics is appreciated there…it will be a good place for you".

So I found myself in Pittsburgh, I had got the job, (much to the relief of my family). Prof Rajagopal and I immediately got into a long ``discussion'' about solids, fluids and plasticity. As anyone who is acquainted with Prof. Rajagopal knows, he is a forceful and passionate arguer. I left the meeting sure that I had offended him. Here I was, a beginning assistant professor, hardly 2 months into a faculty job, arguing with a chaired professor on an issue that he has thought about for a long time . That is when I learnt his first and signature trait and one that I aim to follow: When there is a technical argument, he does not care about rank, only about the merits of the position that was being argued. He has said on numerous occasions , ``we read the great masters not to know what to think but how to think"---a sentiment which has invariably led me into a mode of questioning that has been invaluable in my researches.

This is such an important point, since he is not cowed by even the greats in the field, and is quite as relentless in questioning Newton and Maxwell as he is in questioning anyone else. His approach in this regard has been a guiding principle for me.

The result of his initial discussion with me and numerous other such discussions in the labs and conference rooms at the University of Pittsburgh, has been a long and continuing collaboration on various aspects of the foundations of mechanics (plasticity, friction, constraints etc.) that continues to this day and has resulted in some of my best work in the field. He does not care whether his papers are currently well cited or not or even whether they are well accepted are not, seeking to ``write papers and introduce ideas that posterity will not willingly let die". Fittingly, according to his estimation, his best work is "On the existence of a manifold for temperature", written with R. L. Fosdick, (Archive for Rational Mechanics and Analysis, 81(4)1983 (317-332)) which, at the time of writing (June 2011) had garnered all of 7 citations in Google Scholar), although his most cited works have more than 300 citations .

Prof. Rajagopal is a person who brings the same passion to seek out the truth that he shows in research also to every other aspect of his life. I have seen him fight for clearly lost causes even at personal cost when we believed that the cause was just.

Another one of Prof. Rajagopal's inimitable style is his mode of questioning. While it is almost axiomatic that questioning is a fundamental step in research, most of us generally ask ``what?", ``why?" or "how?" questions. Raj is, to my knowledge, the only person who always asks ***``why not?"*** and comes up with the most surprising answers. His

iconoclastic way of thinking, upending conventional wisdom, and lazy and comfortable thinking, has been the source of many breakthrough ideas in mechanics, such as his work on implicit theories, his work on pressure dependent viscosity of fluids, his work on the foundations of thermodynamics, re-examination of the notion of elasticity… the list goes on. His iconoclastic way of thinking has always made me re-examine everything I know on a regular basis and caused me to abandon cherished notions and ideas in mechanics. He has a humourous way of putting it:

"A good researcher has to be ``unprincipled", ``opportunistic" and "relentless". In other words, a good researcher cannot be encumbered by so called fundamental ``principles" but has to re-examine them in the light of new evidence , "opportunistic" in the sense that a good researcher is always on the lookout for new ideas from anywhere and is not just a slave of the current dogma, and "relentless" in pursuing ideas to their logical conclusion and abandoning even cherished notions ones their limitations have been laid bare.

Prof. Rajagopal is a dedicated, fascinating , spellbinding teacher who keeps his class on its toes by his unexpected and impish humor. He has won the Texas A&M University, Association of Former Students (AFS) Award (one of the most prestigious teaching awards at the university) for his teaching. He does not view teaching as being different from research---it is all a seamless whole. Nothing exemplifies this more than the fact that, most of his graduate classes are usually filled with other faculty who have come to listen to him and many of his courses have resulted in students publishing research papers out of the course from his course projects. He has taught many undergraduate courses including freshman level courses (such as introduction to engineering) as well as junior courses (such as strength of materials). He again brings a fresh new perspective to these courses that challenge what is usually taught more out of habit than based on a rational analysis of what is actually required. His example of outstanding teaching and great research has been instrumental in show new faculty that it is possible to be better teachers without sacrificing research and that in fact it is helpful.

While his reach in mechanics is vast (as exemplified by the papers that he has written, see the attached list), all his activities and accomplishments can be distilled to a simple and consistent foundational principle " always seek what we think is the truth". When questioned "why not just say, always seek the truth?", his answer was "how do you know what truth is ? if you don't, how can you seek it ".

This issue is dedicated to my friend and mentor Prof. K. R. Rajagopal.

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From my perspective of a faculty of Indian Institute of Technology, Madras, (IITM), I would like to share some thoughts and anecdotes on how Prof.Rajagopal has interacted with us and how his presence at IITM has kindled our minds. IITM is Prof. Rajagopal's and our Alma Mater. So our association with it goes back a long time. I have the privilege of being a faculty there. Prof. Rajagopal is a frequent visitor there.

I remember it was one morning when I stepped into one of my colleagues' room for a 'chai' chat—a quick chat over a cup of hot tea that is a fixture at IITM and many other educational and research institutions in India- that I found a man in conversation with my colleague, introduced as a faculty from the University of Pittsburgh, if remember correct. Characteristically, he immediately struck a conversation on the work I am doing. "So, you are doing deformation plasticity", he asked. I said, "No, incremental plasticity", with the little of what I understood about plasticity from my Ph.D. work. Within minutes, I knew I was talking to a person who has mastered inelasticity and continuum mechanics.

Helping IIT Madras excel in teaching and research activities has been one of Raj's passions and his lasting contribution to IITM. Whenever he visited Chennai, which was frequent, he made sure that he was in touch with us (faculty at IITM), and showed that he cared about how were progressing with our research, plunging into detailed discussions of research ideas, with little fanfare or preliminaries, continuing wherever he left off in the previous visit.

Not even a single time did he talk about the papers he has published and the editorial boards that he was in etc. In fact, surprisingly, we never cared to find out until the time we had to introduce him and therefore, looked at his biodata!!!

Conversations with Raj have always been thought-provoking and at times have spurred seminal activity at IIT Madras. The engineering sciences group was one of the early ones, a forum for us all at IITM and beyond to meet regularly and have intense discussions in engineering sciences. The flavor of mechanics dominated in many of the discussions. He inspired, those who held top administrative positions at IITM to also be part of it but more as a faculty interested in the discussions rather than being there as administrators. Various people like Prof.Ananth (*Director of IIT Madras*), Prof.V.Balakrishnan (*a renowned physics professor at IITM*) , Prof. Muthukrishnan (*former Deputy Director of IITM*), presented their work or their point of view in the forum. Prof.Rajagopal kept the fire burning.

He also influenced our students to think critically. I remember in one of the classes that I invited him to speak, he kindled their thoughts by bringing about questions related to the very basic concepts and laws. He urged that we question authority. Many students who got a glimpse of his thought-provoking talks, are now young faculty in many institutes all over the world. He once taught continuum mechanics to some of us through 25 hours of lecture spanning over just 3 days. The intensity in his approach to the subject and depth to which he went to was phenomenal - filled with stories, historical context, anecdotes and also what he thought about them. He took pains to bring eminent continuum mechanicians to the campus and held workshops (*International workshop on Solid Mechanics, International workshop on Fluid Mechanics, workshop on viscoelastic solids, to name a few.*), triggering interest in research in IITM. We owe a lot to him in that sense. Even today, he is relentless in asking the right questions to trigger thinking in us. To many of us at IITM, he is a teacher of teachers. Thanks to his efforts, five of his students have forsaken very remunerative jobs in the private sector to join the IIT system as faculty.

He is one of the extraordinary people I met when I was a young faculty and I owe a lot to him for having made a difference to my thinking process and style however slow I have been to meet to his expectations.

I know at least one way to show our gratitude to him and celebrate his 60th birthday and that is by soliciting papers from several of his associates spread all over the globe. This issue is thus dedicated to a man who got many of us at IITM into thinking differently and questioning the very roots of the concepts and laws of science.

Prof.Rajagopal has treaded a path that is not easy to follow - meaningfully so - because he wishes that people question every authority for the sake of learning and generating the knowledge from within. What keeps him going is the affinity to acquire basic knowledge and constantly questioning the wisdom, only to update it.

It doesn’t surprise me that there was ready acceptance to contribute to this issue from many of his associates and some who eagerly wanted their article included in this issue as a tribute to him.