

## Technical Workshops Series – 2020

## Online lecture course on Introduction to Rheology

- Organized by Venture Center -

<b>Learn</b>	<ul style="list-style-type: none"> <li>Fundamentals of rheology</li> </ul>
<b>Organized by</b>	<ul style="list-style-type: none"> <li>Venture Center</li> </ul>
<b>Supported by</b>	<ul style="list-style-type: none"> <li>NIDHI Center of Excellence at Venture Center</li> </ul>
<b>For whom</b>	<ul style="list-style-type: none"> <li>Industry professionals</li> <li>Students, academics and researchers</li> </ul>
<b>When</b>	September 14-17   1600 – 1700 hrs
<b>Where</b>	Workshop will be conducted through an online platform. Registered participants will be sent invitations and links to join the workshop
<b>Contact</b>	<i>Technical queries:</i> Sujaya  9172232214  lab@venturecenter.co.in <i>Registration queries:</i> Sayali  020-25865877  sayali@web.venturecenter.co.in
<b>Registration</b>	Event is free. Registration is mandatory Registration link: <a href="https://bit.ly/32N5sgb">https://bit.ly/32N5sgb</a> Registration Process: Step 1: Interested participants need to fill in registration form at the above given link. Step 2: Online platform link will be sent prior to the event More details at: <a href="http://www.venturecenter.co.in/workshops/">http://www.venturecenter.co.in/workshops/</a>

### Introduction

Rheology is the study of the deformation and flow of matter. The subject is of widespread applicability within both academic as well as industrial settings, and is interdisciplinary in nature. Primarily, the materials under study in rheology exhibit a combination of elastic and viscous behavior when subject to different kinematics. The goal of theoretical rheology is to establish relationships between the imposed deformation and the response of the material to the deformation. Experimental rheology (rheometry) is primarily concerned with the measurement of rheological quantities and with probing the internal microstructure of soft matter.

Pre-requisite: Elementary knowledge of Newtonian fluid dynamics.

### Workshop Outline

- Dimensionless quantities. Viscoelastic effects.
- Shear and normal stresses with examples. Role of pressure in rheology.
- Mechanical models (Kelvin, Maxwell, Jeffreys, Roscoe's theorem), General Linear Viscoelastic Model.
- Shear rheology: Small-amplitude oscillatory shear, creep, step strain/strain-rate, thixotropic loop test. Cox-Merz rule.
- Normal-stress differences. Startup test.

- Extensional rheology: Uniaxial, biaxial, and planar extension.
- Introduction to rheometry.

### Workshop includes

- Lectures
- Q&A sessions
- Access to restricted website with online compilation of resources
- Certificate of participation issued by Venture Center

### Workshop Schedule

Time	Session	Lead
Day 1		
1600 – 1605 (5 Min)	Welcome and introduction	Sujaya Ingale
1605 – 1610 (5 Min)	Set the stage for rheology lecture series	V. Premnath
1610 – 1655 (45 Min)	Definitions, viscoelastic phenomena, viscosity, mechanical models	Chirag Kalelkar
1655 – 1700 (5 Min)	Q&A	
Day 2		
1600 – 1655 (55 Min)	General Linear Viscoelastic Model, rheological protocols	Chirag Kalelkar
1655 – 1700 (5 Min)	Q&A	
Day 3		
1600 – 1655 (55 Min)	Normal stress effects, extensional rheology	Chirag Kalelkar
1655 – 1700 (5 Min)	Q&A	
Day 4		
1600 – 1650 (50 Min)	Rheometry	Chirag Kalelkar
1650 – 1700 (10 Min)	Q&A and Closure	

### Speakers and Organisers

	<p>Dr. Chirag Kalelkar is an Assistant Professor at the Indian Institute of Technology, Kharagpur.</p> <p>He did his Ph.D. in Physics from Indian Institute of Science, Bangalore in 2006. He worked as Faculty Research Associate at the University of Maryland (2006-2008), Enhanced Post-doctoral Fellow at the National Chemical Laboratory (2008-2009), visiting Post-doctoral Fellow at the Raman Research Institute (2010) and as Research Associate at the Massachusetts Institute of Technology (2011-2012). Chirag works in the area of experimental fluid dynamics and soft condensed matter</p>
	<p>Dr. Premnath V. is currently the Head- NCL Innovations, Head -Intellectual Property Group at NCL, Scientist-Polymer Science &amp; Engineering Division at NCL and Director-Venture Center. He holds a B.Tech. from the IIT-B and a Ph.D. from the MIT, USA. He has also been a Chevening Technology Enterprise Fellow with the Centre for Scientific Enterprises, London Business School and Cambridge University, UK. He brings with him considerable experience in technology development and commercialization (two successfully commercialized families of biomedical products), incubation and innovation management, working with start-up companies (in Cambridge-UK and India) and engaging with large corporations on research and consulting projects as project leader.</p>
	<p>Sujaya Ingale is Sr. Manager at Venture Center. She leads and coordinates Scientific &amp; Prototyping initiatives at Venture Center. She manages scientific resources, facilities, services and ensures Environment Health and Safety compliance at Venture Center. She is M.Sc in Microbiology (Pune University). She has several years of research experience in biotechnology projects, experience in setting up and oversight of Venture Center's Lab facilities, running and assisting in proof-of-concept projects, and in creating, planning and organizing technical and scientific workshops for life sciences students and scientists.</p>
	<p>Sayali Kothmire is Coordinator-Protoshop at Venture Center. She is B.E.(Instrumentation &amp; Control Engineer) from University of Pune. She manages operations at Protoshop, provides training, plans &amp; executes setting up &amp; maintenance work in Protoshop also involved in creating, planning and organizing technical and scientific workshops &amp; hands-on lab exercises with Tinkering lab instruments.</p>

### About the organizers

	<p>Entrepreneurship Development Center (Venture Center) – a CSIR initiative – is a Section 60 company hosted by the National Chemical Laboratory, Pune. Venture Center strives to nucleate and nurture technology and knowledge-based enterprises by leveraging the scientific and engineering competencies of the institutions in the Pune region in India. The Venture Center is a technology business incubator supported by the Department of Science &amp; Technology's National Science &amp; Technology Entrepreneurship Development Board (DST-NSTEDB). Venture Center focuses on technology enterprises offering products</p>
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	<p>and services exploiting scientific expertise in the areas of materials, chemicals and biological sciences &amp; engineering.          For more information, visit <a href="http://www.venturecenter.co.in/">http://www.venturecenter.co.in/</a></p>
 <b>PROTOSHOP</b>	<p>Protoshop combines Tinkering lab and Prayashala, which are the prototyping facilities at Venture Center. Protoshop is an initiative of Venture Center (a technology business incubator hosted by CSIR-NCL) with the generous support from in-house funds and the host Institution. It aims at providing services to the Inventors and Entrepreneurs to design and build their prototypes and bringing their ideas into life.          For more information about Protoshop: <a href="http://www.protoshop.in/">http://www.protoshop.in/</a></p>
 <b>NIDHI CENTER OF EXCELLENCE</b> @ Venture Center	<p>The National Science and Technology Entrepreneurship Development Board (NSTEDB), Department of Science and Technology, Government of India has awarded Venture Center with the status of a NIDHI-CoE (National Initiative for Developing and Harnessing Innovations — Center of Excellence an umbrella programme conceived by DST). This award is accompanied by a grant of Rs. 50 Cr for 5 year duration to help Venture Center scale-up its activities and demonstrate greater success to accommodate more than 100 startups at any time and to upgrade and add new facilities for supporting science and technology based startups. NIDHI-COE is catalyzed and supported by NSTEDB Division, Department of Science and Technology, New Delhi.          For more information, visit: <a href="http://nidhicoe.venturecenter.co.in/">http://nidhicoe.venturecenter.co.in/</a></p>