Special Issue

Advances in Mechanical Seals

Message from the Guest Editor

O-ring fatigue life is a key determinant of sealing reliability in valves, pumps, and aerospace actuators operating under cyclic pressure/temperature, media exposure, and variable squeeze. Damage accumulation—micro-crack initiation, viscoelastic softening, and extrusion/nibbling—alters contact stress and can cause early leakage. Advances in materials, testing, and multiphysics modeling enable more accurate life prediction and mitigation strategies.

This Special Issue invites original research and reviews on fatigue and leakage of O-rings, including pressure/thermal cycling and accelerated aging, media compatibility, in situ leakage/strain monitoring, FE-based hyperelastic–viscoelastic modeling, contact and thermal–fluid–structure coupling, crack-growth and energy-based approaches, and the roles of material formulation, surface roughness, squeeze ratio, and groove design. Studies on uncertainty, reliability, and data-driven diagnosis/prognosis are also encouraged, with applications spanning cryogenic, aerospace, oil-and-gas, and chemical services.

Guest Editor

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Message from the Editor-in-Chief

Friction, wear, and lubrication are tribological phenomena that govern the behavior of interacting surfaces in a wide range of machine components. Understanding the physical and chemical nature of these phenomena is critical to achieving long component lifetime and economical operation. Research in the field of tribology is highly interdisciplinary, and encompasses the fields of physics, chemistry, engineering, and mathematical modeling. *Lubricants* invites contributions on new advances in all areas of tribology for publication as peer-reviewed research articles, reviews of current research, letters, and communications. We are committed to providing timely reviews of all articles submitted. Please consider sharing your work with the scientific community through publication in *Lubricants.*

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