Viscosity, Gas Absorption, and Density of Several Multiphase Lubricants.
Lee R. Dickerson, H. Grady Rylander and George W. Crawford. *ASLE Trans.*, *4* (1961) 227–233.
The viscosity, solubility, and density of several two- and three-phase lubricants were determined experimentally in a temperature range of 80° F to 200° F and a pressure range of 50 p.s.i.a. to 600 p.s.i.a. Equations were found which would accurately describe the viscosity and density of these lubricants at other temperatures and pressures. Micro-size particles of molybdenum disulfide were suspended in petroleum-base oil with absorbed quantities of various gases. Lubricants of 4 wt.% gas–oil mixtures had viscosity decreases of up to 60% relative to the oil viscosity, while the oil density remained virtually unchanged.

Elasto-Hydrodynamic Lubrication of Rolling-Contact Surfaces.
L. B. Sibley and F. K. Orcutt. *ASLE Trans.*, *4* (1961) 234–249.
An X-ray technique is described for the measurement of the thickness and shape of thin oil films (from 5 to 50 millionths of an inch thick) formed between the rolling and rolling–sliding surfaces of hardened steel rollers as in rolling bearings and gears. The film thickness with white mineral oil, diester-base, and silicone lubricants was found to vary with temperature (viscosity), speed, and load in much the same way as expected from elasto-hydrodynamic considerations. The shape of the elastically flattened contact regions on the rollers appeared to change with rolling speed in such a way as to explain why ball bearings and gears have longer fatigue life (in revolutions) at high speed than at low speed.

The experimental results are compared with lubrication theory in which the elastic deflections of the bearing surfaces are combined with the viscous flow of the lubricant under pressure. Although there is general agreement between theory and experiment, possible modifications to the theory to account for the increasing discrepancy with experiment at high speed, load, and viscosity are discussed.

Calculated Performance of Non-Newtonian Lubricants in Finite Width Journal Bearings.
H. H. Horowitz and F. E. Steidler. *ASLE Trans.*, *4* (1961) 275–281.
A numerical procedure has been developed for the calculation of the performance of non-Newtonian, polymer-thickened lubricants in finite width journal bearings. Such oils were found to act as if they had averaged "anisotropic viscosities", *i.e.*, different viscosities in the circumferential and side leakage directions, even though the viscosity was taken to have one definite value, a function of the resultant shear stress, at each point in the oil film. Overall, polymer oils carried less load at a given eccentricity, gave less friction and a flatter pressure distribution than mineral oils of the same low shear viscosities. By analogy with the previously calculated infinite width case, which gave similar results, it is expected that the flatter viscosity temperature slope of the polymer oils will compensate for their apparent viscosity decrease. The program has also been adapted to "natural" boundary conditions, which improve upon the delineation of the cavitation region on the inlet side of the bearing.

Fundamental Research on Gear Lubrication.
Tokio Sasaki, Kenjiro Okamura and Ryozo Isogai. *Bulletin JSME*, *4* (1961) 382–394.
Experiments with roller testing apparatus with which the frictional moment and the electrical resistance between the rollers were measured under various driving conditions of contact load, rolling speed, specific sliding, oil viscosity, relative radius of curvature and roughness of contact surface.

3.2 Lubricants

The Lubrication of Nuclear Power Plants.
R. S. Barnett. *NLGI Spokesman*, *25* (4) (1961) 92–106.
Deals with the origin and beneficial application of nuclear power, and with the many lubrication problems that are being solved.

Lubricating Oil Requirements of Large Gas Engines.
L. O. Bowman and R. S. Ridgway. *ASLE Trans.*, *4* (1961) 250–256.
This paper discusses lubricating oil field tests conducted in two-cycle and four-cycle engines fueled with natural gas. The main objective was achieved; *i.e.*, high performance lubricants were developed with low ash-forming properties. In the four-cycle engine program, it was found that (a) good oil oxidation stability was a primary requirement, (b) increasing either detergent or oxidation inhibitor level reduced piston ring belt deposits, and (c) a compounded paraffinic oil was markedly superior to an equally compounded naphthenic oil. In the two-cycle engines, (a) increased detergent concentration reduced port deposits, and (b) piston head deposits correlated with the oils' ash content.

Degradation of High Temperature Lubricants and Metals by Fluoroelastomers.
John J. Murray and Eugene P. Scanlan. *ASLE Trans.*, *4* (1961) 220–226.
The structural and functional components of high temperature lubrication systems are metal assemblies, lubricants and elastomeric seals. How do combinations of these effect