INFORMATION RETRIEVAL

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A correlation of the frictional characteristics for turbulent flow of dilute viscoelastic non-Newtonian fluids in pipes, Meyer, Warren A., **A.I.Ch.E. Journal, 12,** No. 3, p. 522 (May, 1966).

Key Words: A. Fluid Flow-8, Turbulent Flow-8, Fluids-9, Viscoelastic-0, Non-Newtonian-0, Polymer Solutions-9, Correlating-8, 4, Predicting-8, 4, Frictional Characteristics-9, Friction Velocity-9, Friction Factor-9, Velocity-9, Equation-10, 8, Rheometer-10, 8.

Abstract: An equation which predicts the frictional characteristics of the turbulent flow of a dilute viscoelastic non-Newtonian fluid in a pipe is derived. The equation contains two elastic fluid parameters, one of which is dependent on both polymer solute and concentration. The other parameter appears to be a constant and independent of the polymer solute. An argument is presented for the use of a rheometer based on this equation. The equation and theory presented in this paper are used to evaluate and interpret the results of work done by other authors.

An experimental study of falling liquid films, Jones, L. O., and Stephen Whitaker, **A.I.Ch.E. Journal, 12,** No. 3, p. 525 (May, 1966).

Key Words: A. Evaluating-8, Validity-9, 8, Utility-9, Effectiveness-9, Small Disturbance Theory-9, 8, Experiment-10, Measuring-4, 8, Calculating-4, 8, Wave Number-2, 9, Wavelength-2, 9, Wave Velocity-2, 9, Falling Liquid Films-9, Orr-Sommerfeld Equation-4.

Abstract: A new method for measuring wavelength and wave velocity is described, and experimental values for water flowing down a vertical plane are compared with a numerical solution of the Orr-Sommerfeld equation. Good agreement is obtained in the region near the top of the film where small disturbance theory is expected to be valid. Experimental Reynolds numbers ranged from 8 to 120.

Mass transfer from large oscillating drops, Rose, P. M., and R. C. Kintner, **A.I.Ch.E. Journal, 12,** No. 3, p. 530 (May, 1966).

Key Words: A. Heat Transfer-8, 9, 7, Mass Transfer-8, 9, 7, Drops-10, 9, Oscillating Drops-10, 9, Liquids-9, Oscillation-6, 9, 8, Interfacial Stretch-6, Internal Mixing-6, Amplitude-6, Frequency-6, Rates-7, 2, Deriving-8, Model-2, 8, Equations-2, Calculating-4.

Abstract: A mass transfer model for vigorously oscillating single liquid drops moving in a liquid field has been developed by using the concepts of interfacial stretch and internal droplet mixing. The model takes into account both amplitude and frequency of drop oscillations. Rates of transfer from an oscillating drop to the continuous phase are calculated with this model and are compared to experimentally determined rates.

Effects of product recycle and temperature on autocatalytic reactions, Ahn, Yong-Kee, Liang-Tseng Fan, and Larry E. Erickson, **A.I.Ch.E. Journal, 12,** No. 3, p. 534 (May, 1966).

Key Words: A. Concentration-6, Temperature-6, Recycle-6, Yield-7, 9, 2, Rate-7, 9, 2, Product-9, Reaction-9, 8, 4, Autocatalytic-0, Optimization-8, Calculation-8, Derivation-8, Rate Equations-2, Kinetics-2, Maximum Principle-10, Kinetic Model-10, Biochemical Processes-4, Growth Processes-4.

Abstract: The effect of product recycle and temperature on the maximum yield of product for several different autocatalytic reactions taking place in a tubular reactor is studied. A generalized version of the maximum principle is used to determine the maximum conversion and optimal temperature profile for each of the reactions considered. The fraction of product recycled, which affects the concentration of autocatalytic agent entering the reactor, is investigated to determine its effect on the maximum conversion.

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The Engineer's Companion, Mott Souders, John Wiley and Sons, New York (1966). 414 pages, $8.95.

This book is, to a great degree, the bringing up to date of "The Engineers' Manual by Ralph G. Hudson which was published by Wiley in 1917. Probably few of our younger engineers are familiar with the old tool, and would find this new book useful. In it the author has brought together engineering fundamentals, comprehensive in scope, which, he says, is largely material "imperfectly recollected."

The contents have been divided into nine sections of unequal length. These are in order, Mathematics, Mechanics, Fluid Mechanics, Thermodynamics, Heat Transfer, Electricity and Magnetism, Nuclear Physics, Engineering Economy, and Mathematical and Physical Tables, along with conversion factors. Of these the first and last are the most complete and really need little mention. They contain material which every engineer uses often and on which his memory is of little use.

Section 2 on Mechanics covers the basic principles of statics and those of kinetics and dynamics followed by the mechanics of materials such as stresses and properties of beams, etc. The following nineteen pages on Fluid Mechanics cover both fluid statics and dynamics, presenting concisely the more important concepts of the latter. The twenty-five pages on Thermodynamics contain general equations and the relations of simple systems, thermodynamic engines and refrigeration systems, then touch briefly on phase equilibria and generalized thermodynamic properties.

The section on Electricity and Magnetism gives the basic electrical laws and relations of direct and alternating currents and electrical machinery. Electronics is something with which the engineer did not deal fifty years ago, so that the material on electron dynamics and matrix interrelations, high frequency circuits, and transistor bias must be sought in a modern manual. Nuclear Physics has fifteen pages devoted to it but it is suspected that engineers who work in this area will probably make little use of them.

Engineering Economy, a subject in which the author has been much interested, is given only six pages but the addition of compound interest, present worth, and annuity tables makes it worthwhile. Finally, the mathematical and the conversion tables are exceptionally complete and these all engineers will use.

That is the book. As the author states, it is not "a short-cut to design." The user will have to take the fundamentals given and carefully watch his dimensions in their application. He will

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The influence of axial dispersion on carbon dioxide absorption tower performance, Brittan, Michael I., and Edward T. Woodburn, **A.I.Ch.E. Journal, 12,** No. 3, p. 541 (May, 1966).

Key Words: A. Mass Transfer-8, 9, Absorption-8, 9, Carbon Dioxide-1, 2, 9, Nitrogen-1, 9, Water-5, Absorption Tower-10, 9, Packed-0, Countercurrent-0, Axial Dispersion-6, Liquid Rates-6, Gas Rates-6, Height-6, Rate-7, Performance-7, Mass Transfer Coefficient-7, 2, Comparing-8, Applicability-9, Piston Flow Model-9, 10, Axial Diffusion Model-9, 10, Calculating-4, 8, Concentration Profiles-2.

Abstract: Carbon dioxide was absorbed from mixtures with nitrogen by countercurrent contact with water in an experimental packed tower. Radial and axial gas concentration profiles were determined from measurements made within the packing. Characterizing the gas flow regime by both piston flow and axial diffusion models yielded mass transfer data and computed axial gas concentration profiles. Comparison of the piston flow and axially dispersed profiles with the experimental profiles enabled conclusions to be drawn regarding the applicability of the axial diffusion model and the accuracy of available dispersion-parameter values.

Diffusion of gases in electrolytic solutions, Gubbins, Keith E., Kamlesh K. Bhatia, and Robert D. Walker, Jr., **A.I.Ch.E. Journal, 12,** No. 3, p. 548 (May, 1966).

Key Words: A. Measuring-8, Diffusivity-9, 8, 7, Fluidity-9, 8, Diffusion-9, 8, Diffusion Coefficients-9, 7, 1, Hydrogen-9, Methane-9, Gases-9, Water-5, Solutions-5, Electrolytes-5, 6, Potassium Chloride-5, 6, Magnesium Chloride-5, 6, Manganese Sulfate-5, 6, Diaphragm Cell-10, Calculating-8, Diffusion Activation Energy-2, Concentration-6, 1, Ions-6, Temperature-6, 1, Eyring Rate Theory-10.

Abstract: Measurements of the diffusion coefficients of hydrogen and methane in strong aqueous electrolytes have been made with the use of the diaphragm cell method. The variation of the diffusion coefficients with electrolyte concentration, type of ion, and temperature has been studied for temperatures in the range 25° to 65°C. The results have been interpreted with the Eyring rate theory and the diffusion activation energies have been calculated.

Heat transport and temperature distributions in large single drops at low Reynolds numbers: A new experimental technique, Head, Harlan N., and J. D. Hellums, **A.I.Ch.E. Journal, 12,** No. 3, p. 553 (May, 1966).

Key Words: A. Measuring-8, 4, Temperature Distribution-9, 8, Temperature Profiles-9, Fluid Dynamics-9, Rates-9, Heat Transfer-9, 8, 4, Dielectric Heating-10, 8, 4, Apparatus-10, 8, Drops-9, Suspended-0, Single-0, Water-Glycerol-9, Experimental Techniques-10, 8, New-0, Thermocouple-10, Thermocouple Probe-10.

Abstract: A new experimental technique for obtaining detailed measurements of the temperature distributions in and around drops is reported. The large single drops (glycerol-water mixtures) studied are suspended in a continuous phase flowing liquid (high viscosity silicone fluid) and heated indirectly by high-frequency dielectric power. Rates of heat transfer from a drop are obtained by measuring the temperature rise in the continuous phase liquid as it passes the drop. The actual temperature distribution within a cooling drop is obtained by use of a fine thermocouple probe.

Viscosity and thermal conductivity of nitrogen–*n*-heptane and nitrogen–*n*-octane mixtures, Carmichael, L. T., and B. H. Sage, **A.I.Ch.E. Journal, 12,** No. 3, p. 559 (May, 1966).

Key Words: A. Measuring-8, Viscosity-9, 8, 7, Thermal Conductivity-9, 8, 7, *n*-Heptane-9, *n*-Octane-9, Nitrogen-9, Gases-9, Mixtures-9, Pressure-6, Temperature-6, Composition-6, Rotating Cylinder Viscometer-10. B. Calculating-8, Viscosity-2, 7, Thermal Conductivity-2, 7, Gases-9, *n*-Octane-9, *n*-Heptane-9, Air-9, Mixtures-9, Temperature-6, Composition-6, Lindsay-Bromley Correlation-10, Chapman-Cowling Equation-10.

Abstract: Measurements of the thermal conductivity and viscosity of *n*-heptane and *n*-octane in the gas phase were made at temperatures of 100° and 160°F. and at pressures below 1 atm. In addition, measurements of the viscosity and thermal conductivity of binary gas mixtures of nitrogen and *n*-heptane were made at 160°F. at pressures below 1 atm. Viscosity and thermal conductivity of air–*n*-heptane and air–*n*-octane systems were calculated.

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not be able to get along without his standard references and handbooks; the former have been listed at the end of each section.

In my first attempt to make actual use of the Companion I was, I regret to say, disappointed, having wished to find quickly the internal areas of a standard 5-in. pipe and of a 12-in. Schedule 80 pipe. The pipe table does not give internal areas nor outside surface areas nor is reference made to the ASA Standard Pipe Schedule which, I think, is unfortunate.

The printing is clear and the type is highly legible. The only typographical error I have caught was on page 30 where, under Probability, one of the 4 aces is spelled "3aces."

The book is not meant to serve a single discipline, and will be of more use to the generalist than to the design engineer or specialist who may need the complete story. But the generalist should not have forgotten all his fundamentals or the reminders here may not serve him too well, but if he has not, and does not wish to be burdened with the usual large, heavy volumes, this little book, 8½ in. by 5¾ in. by ⅞ in., may make a handy companion.

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ERRATA

In "Velocity and Pressure Profiles for Newtonian Creeping Flow in Regular Packed Beds of Spheres" by L. J. Snyder and W. E. Stewart (Vol. 12, No. 1, pp. 167-173), on page 170 the last sentence in the last complete paragraph should read: The predicted superficial velocities v_0^* are shown in Figure 2; for large N an extrapolated value $v_0^* = 0.000258$ is indicated. The experimental results of Martin and co-workers give a value $v_0^* = 0.000267$ which agrees well with the result in Figure 2.

In "Heat Transfer to Non-Newtonian Fluids in Transitional and Turbulent Flow" by A. W. Petersen and E. B. Christiansen (Vol. 12, No. 2, pp. 221-232), Equation (43) should read

$$Z' = \frac{1}{2} \frac{\rho}{(dp/dz)} \frac{d}{dr} (u^2)$$