

Meetings

SOCIETY OF RHEOLOGY

WEST COAST MEETING REPORTED

The papers presented at the second annual meeting of the West Coast Section of the Society of Rheology covered an unusually wide range of rheological subjects. The meeting was organized by A. A. Bondi in cooperation with the Division of Mechanical Engineering of the University of California and was held on the Berkeley Campus on December 1, 1950.

V. R. Smith discussed the flow properties of petroleum asphalts as revealed by coaxial cylinder type (non-rotating) viscometer measurements. The influence of temperature upon the visco-elastic properties of asphalts was demonstrated and the effect of refining procedures discussed. It was shown that even those asphalts which exhibit markedly non-Newtonian flow properties do not possess measurable yield values. The shearing stress-rate of shear data was found to be describable by a simple power function and the use of the exponential factor was recommended for characterizing various asphalts.

S. A. Schaaf and R. G. Folsom presented a paper on the fundamentals of rarified gas dynamics. Similarities and differences between the results of continuum theory and kinetic theory were discussed and various alternative expressions for the stress tensor and heat flux vector presented. Recent experimental work designed to study various flow and slip phenomena was outlined.

J. A. Putnam and M. B. Biles discussed the viscosity of gases and elevated pressures and temperatures. The gas viscosity data were obtained in connection with the development of a gas metering device employing a large aluminum thimble. Viscosity determinations were made for air and nitrogen at 75°F for pressures up to 1000 psi and for air at 517°F over the same pressure range. An apparatus employing porous membranes and designed specifically for viscosity measurements would improve the accuracy considerably.

The pressure coefficient of the viscosity of liquids was the subject of A. A. Bondi's paper. The pressure coefficient can be expressed as a characteristic volume which is closely related to the geometry of the flow process. Although the magnitude of this volume cannot be predicted from first principles as yet, a few semiempirical correlations have been found based on the observation that the ratio of characteristic volume to molar volume is large for rigid and spherical molecules and small for elongated and flexible ones. One correlation relates the characteristic volume to expansion at the melting point. A relation was also shown to exist between mobile segment size of linear chain molecules and their viscosity-pressure coefficient. A third method estimates the characteristic volume from the temperature coefficient of viscosity and the internal pressure. It was shown that the correlation of temperature and pressure coefficients of viscosity is limited to series of liquids of equal internal pressure.

W. M. Sawyer and J. D. Ferry presented some recent results on the mechanical properties of concentrated polymer solutions. The dynamic rigidity and the dynamic viscosity of such systems have been studied by means of transverse

waves generated by a sinusoidal shearing stress and via electrical measurements using an electromagnetic transducer. Using the above methods the mechanical properties of polyvinyl acetate have been measured in several solvents and at various concentrations and temperatures in the low audio frequency range. A single function describing the distribution of relaxation times can be derived from the dispersion of either the dynamic rigidity or the dynamic viscosity.

Rheological manifestations of chemical reactions in wool fibres were discussed by H. P. Lundgren. The stress-strain behavior of wool was correlated with its morphology and ultimate chemical constitution. The influence on rheological behavior of controlled chemical modification and of isolated morphological components was described. The stabilizing function of hydrogen bonds and disulfide bonds was discussed and the possible practical applications of propiolactone modified wool pointed out.

C. J. Penther, L. B. McKee and C. H. Klute described an electrical extensometer for use in tension testing of vulcanized rubber and similar elastomers. The aim of this work was to design a device which records automatically and accurately the elongation of the reduced section of the specimen without interfering in principle or in fact with the test. This has been accomplished by designing an extensometer based on the principle that the specimen shall contribute only a negligible amount of energy to the sensitive elements of the instrument, this energy serving only to energize shaded pole motors through thyatron circuits and the motors so energized to contribute the power to operate the extensometer. This apparatus allows the routine determination of tensile properties with an accuracy exceeding that of techniques generally employed today and has been shown to be successful with materials ranging in stiffness from almost gummy to almost horny.

J. E. Dorn discussed the strain hardening of metals with particular emphasis on the role of alloying elements. The amount of solid solution hardening in aluminum alloys was found to be controlled mainly by two factors: the strain introduced in the lattice and the difference in valence between the solute and solvent metals. Silver, for example, causes appreciable solution hardening in spite of the fact that practically no lattice strain results when it is dissolved in aluminum. The results are well correlated on the basis of the change in the mean number of free electrons per atom of solid solution. On this basis aluminum appears to contribute two electrons per atom to the metallic bond in its alloys.

G. J. Dienes

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ACOUSTICAL SOCIETY

FALL MEETING IN NEW ENGLAND

The Acoustical Society of America held its Fortieth Meeting in Boston and Cambridge on November 9-11, 1950. The total registration of 325 members and guests made this one of the largest meetings of the Society to be held elsewhere than in New York or Washington. The local citizenry would be the last to deny that New England is indeed a focal point for activity in the acoustics field, but the wise and beneficial influence of government support of research in promoting attendance at such meetings is also to be duly acknowledged. The technical sessions were divided in locale between the Statler Hotel in Boston and Harvard University in Cambridge, the coincidence of the Armistice Holiday with the sacrificial mission of the Harvard football team to

Princeton leaving the University premises virtually in the hands of the Acoustical Society for the final sessions. As an innovation, the local committee eliminated the traditional banquet and substituted for it an evening collation and open-house at the Acoustics Research Laboratory of the Massachusetts Institute of Technology. The Acoustical Society, for reasons not strange perhaps, seems always able to muster an autogenous orchestra whose amateur standing veils only better to reveal the professional qualifications of its members. The large attendance at this "sociable" and the evident enjoyment of the opportunity to enjoy mixed company and science at the same time would commend such an informal function to the consideration of other program committees.

The technical program included three invited lectures and forty-three papers contributed by seventy authors. It was thus possible to allow fifteen minutes for presentation of papers without the necessity of holding dual simultaneous sessions, thereby keeping alive for a little while longer the Acoustical Society tradition that everybody listens to all the papers—in the other fellow's specialty as well as his own. E. G. Richardson of King's College (England) opened the first day's program, which was devoted largely to ultrasonics and physical acoustics, with a report on ultrasonic work in progress in Europe. As in a number of other fields of physical science, it is turning out to be rewarding to investigate second-order effects with care and precision. Dr. Yeager and his colleagues at Western Reserve described a novel electrokinetic effect which shows some promise for utilization as a point probe at very high frequencies. R. W. Morse, Brown University, described the unexpectedly large influence of the sound-velocity gradient in the top few feet of the ocean on sound propagation into the so-called shadow zone. In connection with a survey of the acoustical output of marine life in the Narragansett Bay area, detailed analyses of some of the strange noises emitted by certain species of fish were reported by A. S. Kelsey, Jr. and R. T. Beyer (Brown) and Marie P. Fish (Narragansett Marine Laboratory). Other contributions to this portion of the program chronicled with due formality the steady march toward understanding the fundamental physics of sound generation and transmission.

The second day of the meeting was largely devoted to architectural acoustics and was opened with an invited paper by W. Furrer of Berne, Switzerland on acoustical studio design practice in Europe. Post-war reconstruction of radio broadcast facilities in Europe has gone forward vigorously and Dr. Furrer made it clear that American designers will be well advised to keep themselves informed about the innovations receiving tryout on the other side. Other contributions to these sessions made it continually clear that the field of architectural acoustics is a fertile one in which the best is yet to come. Much attention is currently being devoted to the analysis of various objective parameters with which to supplement reverberation time as a correlate to listener satisfaction. The goal of finding a one-dimensional scale on which listening spaces can be rank-ordered according to acoustical merit is still elusive and much of the progress in this field is lateral, but there is a forward component.

The Saturday sessions, devoted to psychoacoustics, provided several high points for this meeting. E. G. Wever, Princeton University, opened the morning session with a challenging review of the modern status of auditory theory. J. C. R. Licklider (MIT) then put forth a duplex theory of pitch perception that manages to stir into the psychophysio-

logical pot the latest thinking of communication experts on autocorrelational analysis. His hypothesis will explain neatly several stubborn paradoxes in hearing if it can be confirmed without being confounded. R. C. Jones (Polaroid Corporation) almost stole the show at the close of the Saturday morning session with a description and demonstration of an automatic device for discriminating between speech and music. To the suggestion that the advertisers who pay the radio bills will scarcely welcome so effective a de-commercializer, Dr. Jones had the compelling reply that any listener willing to pay good money for such a gadget could hardly be catalogued as susceptible to this advertising channel. By utilizing a logarithmic signal rectifier and pulse integration, the device is able to function with good operating margins by capitalizing on the absence of repeated deep intensity minima in the usual spectrum of music sustained by reverberation. Since clarity of diction is a mark of effective oral advertising, Dr. Jones says his device will even "get" the singing commercials.

The final session of the meeting was devoted to apparatus and instrumentation and was high lighted by description of automatic equipment for plotting nonlinear distortion as a function of frequency (H. F. Olson, RCA), and by the presentation of a photographic method for displaying the space patterns of sound radiation from various sources (Winston E. Kock and F. K. Harvey, BTL).

The next meeting of the Acoustical Society will be held at the National Bureau of Standards in Washington, D. C., May 10-12, 1951, and will feature symposia on underwater sound and architectural acoustics.

F. V. Hunt

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LABORATORY DEDICATED

AT UNIVERSITY OF ALABAMA

A dedication program for the University of Alabama's new physics building took place at the University last November 6th. K. K. Darrow of the Bell Telephone Laboratories spoke on electricity in metals and semi-conductors, W. V. Houston of the Rice Institute discussed recent developments in super-conductors, and modern developments in x-ray structure were reviewed by Rose C. L. Mooney, Newcomb College of Tulane University. Other speakers included D. H. Menzel of the Harvard Observatory, Arthur E. Ruark of the Johns Hopkins University Institute for Cooperative Research, and A. M. Weinberg of the Oak Ridge National Laboratory.

The new physics building has about 50,000 square feet of floor space and one wing houses the astronomical observatory, which is equipped with a new 10-inch refractor.

MEETINGS TO BE HELD

LOW TEMPERATURE PHYSICS IN ENGLAND

According to a recent communication from F. E. Simon of the Clarendon Laboratory, the Institut International du Froid (IIF), will hold its first postwar meeting next autumn in London. As the new Unesco Commission for Very Low Temperatures also intended to hold its second meeting in England (the first took place at MIT in 1948), Professors Gorter and Simon, being jointly responsible for arranging the two meetings, discussed with the IIF and Unesco conference organizers the possibility of combining the meetings in some way.

Present plans call for the first meetings to be held at