

## Über die günstigste Krümmung der Bildwand für ein Lichtspieltheater mit Aufprojektion

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[1104]

Es wird eine theoretische Analyse der Lichtwege in einem Kino vorgenommen, ausgehend von

der Annahme, dass der Schirm einen perfekten Spiegel darstellt. Die Analyse wird für gekrümmte Schirme mit verschiedenen Radius durchgeführt, um so einen Überblick über die Rückstrahlungswege des Lichtes zu gewinnen. Aspekte wie Projektionswinkel, Geometrie der Sitzverteilung und Gestaltung der Bildwand werden behandelt. Aufgebaut auf diese theoretische

Annäherung werden Schlüsse gezogen, unter Inbetrachtung der gebräuchlichen Lichtverteilungskurven von Bildwandmaterialien. Die Theorie des "günstigsten Sitzes" wird hervorgebracht und typische Sitzverteilungszonen um den günstigsten Sitz herum werden betrachtet. (Üb. Pablo Weinschenk-Taberner)

# The Association for High-Speed Photography

## Report of Spring Conference

By G. H. LUNN and J. M. STOKES

THE 1967 SPRING CONFERENCE of the Association for High-Speed Photography was held at the University of Newcastle-upon-Tyne, April 11-12. R. J. North, of the National Physical Laboratory, was Conference Chairman and he introduced the speakers to 80 or so assembled members.

### First Day of the Conference

The first speaker introduced by Mr. North was A. E. Wraith of the University of Newcastle-upon-Tyne. His paper, "Twin Flash Observation of High-Rate Fracture Phenomena," described the technique of making a short-duration single-flash photograph of a notched metal specimen under impact. By varying the delay between the impact and the flash trigger, and by using specimens with reliably reproducible crack patterns, a sequence of "stills" was built up to give a full time history record of the crack propagation in the metal.

The experiment was instrumented to determine the energy absorbed by the specimen; any variations from a predetermined figure caused that particular record to be excluded from the sequence. Mr. Wraith said that he hoped to use photo-stress methods in future work on the problem.

A contribution submitted on July 17, 1967, by G. H. Lunn and J. M. Stokes. Information about the Association for High-Speed Photography is available from Mr. Lunn, who is Secretary of the Association, at 57 White-down Road, Tadley, Basingstoke, Hants, England.

The second paper of the session was presented by I. Slaughter, also from the University of Newcastle-upon-Tyne. The investigation, described as "High-Speed Cine (120 to 2000 pictures/s) of Bubble Formation and Motion," was undertaken to study bubble motion and gas injection at high flow rates. The study of air bubbles in water was used as a model of similar techniques which are part of some metal refining processes. The experiments were filmed with an MS-16-A Stalex high-speed camera and records taken of single isolated bubbles being injected at high flow rates. Mr. Slaughter showed a film made up of clips from some of the experimental results. These clips indicated that very small bubbles have an oscillatory positional movement along a line at right angles to the direction of flow, whilst large bubbles had no positional shift but oscillated in shape.

J. Stewart and C. Arnold of AERE, Harwell, then gave their paper "Flash and Cine Studies of Stresses in a Pole-Piece Endplate of an Alternator (NIMROD)." To record the stresses in the alternator pole-piece endplate, photo-stress techniques were used and the photography effected through a port in the alternator housing. Following static tests on a sample endplate to determine loadings, indicated by a photoelastic coating, single flash photographs and strobe-cine records were taken of the alternator in motion. An Eclair motion-picture camera was driven by a "mag-slip" motor controlled from the alternator

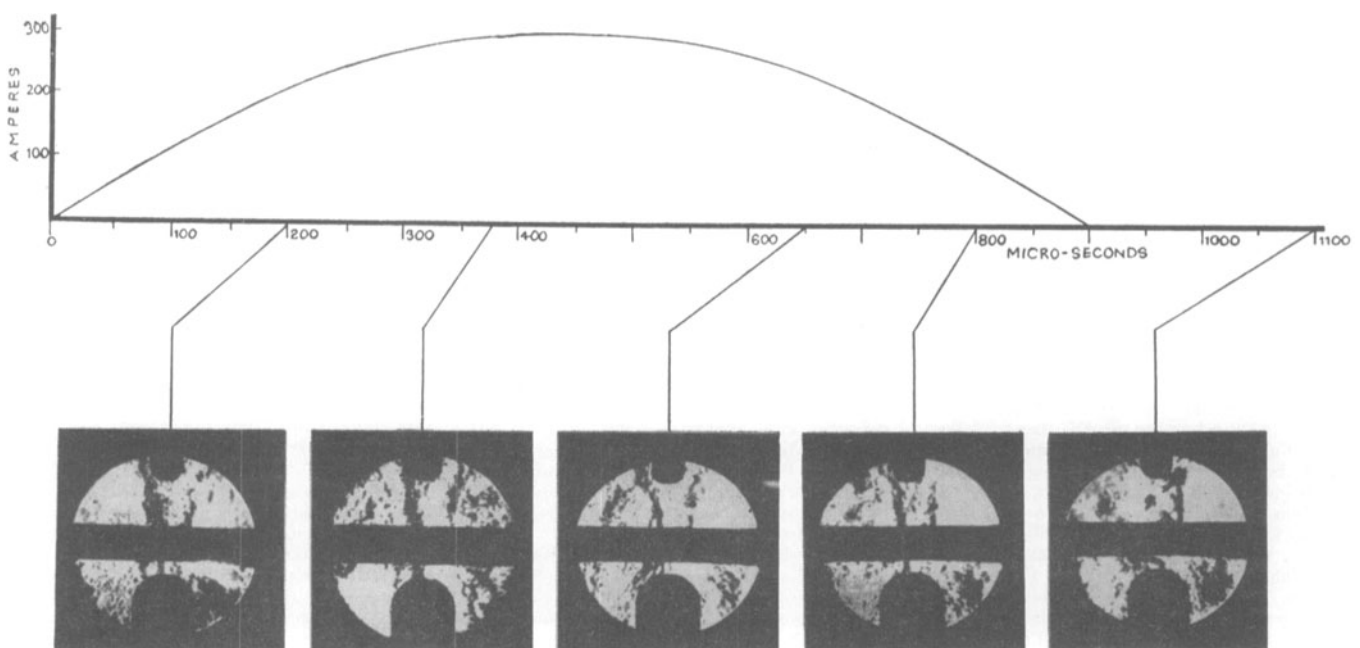


Fig. 1. Typical series of records.

shaft. Every fourth revolution was photographed and the film showed dramatically the forces exerted on the endplate as the alternator pulsed. The strobe light was reflected from a small schlieren mirror, through the polarizer of a Budd Polariscope, reflected back from the endplate through the analyzer of the polariscope and by a second mirror to the camera. The choice of this system was dictated by the restricted working space close to the alternator shaft which was rotating with a circumferential velocity of something approaching 100 miles/hr. A color film of the experiment had been made and was shown at the Conference.

A display of photographic equipment for scientific use was shown and visited especially during a break provided in the papers session. Representatives of Gordon Cameras, John Hadland (P.I.) Ltd. and Telford Products were in attendance to demonstrate their products.

The second half of the first session commenced with a paper by E. F. Hyde of AWRE, Foulness, entitled "Kerr-Cell Color Photograph." Mr. Hyde's paper was more general than its title suggested and consisted of a description illustrated by slides of the experimental facilities using high-speed photographic equipment available at Foulness. In their work at Foulness they generally took both color and black-and-white records of an event. For an overall picture they use a Barr and Stroud C.P.5 camera with color film to show the entire history of the event. In this way much additional information that would be lost in monochrome records is made available. For specific detail at selected times in the sequence Kerr cell cameras using black-and-white film are employed. Slides demonstrating the increased information content of color film over black-and-white for certain experiments were shown.

The first day of the Conference ended with the Annual General Meeting of the Association. The reports of the Chairman, Secretary and Treasurer were read and accepted and the meeting proceeded to the election of four new committee members. The retiring committee members were Messrs. R. J. North, D. P. C. Thackeray, F. I. L. Knowles and L. E. Hallett. Messrs. North and Thackeray were re-elected, Mr. Hallett who is the nominated representative of the Royal Photographic Society was re-appointed. The Secretary said that Mr. Knowles had had a change of duties and did not think he should remain on the committee, his interest, friendliness and knowledge would be greatly missed. J. A. Nunn of RAE Farnborough was elected to fill the vacant place on the committee.

#### Second Day

The Conference reconvened at 9 A.M. on the following day when G. H. Lunn of AWRE, Aldermaston, reported on the "High-Speed Photography Display for EXPO '67." He also gave a "commercial spot" report on commercial equipment presently available.

P. Oates of AWRE, Aldermaston, followed with a paper entitled "Light Sources for Ultra-High-Speed Cine." He pointed out that, although argon flash bombs are an extremely good method of providing the intense short duration flash light source necessary for ultra-high-speed photography, it is impractical to detonate a few pounds of explosive in a physicist's laboratory.

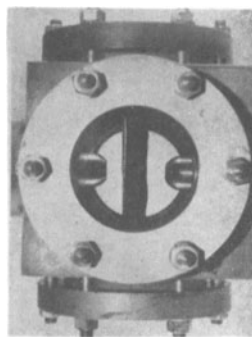


Fig. 2. Typical model blast switch.

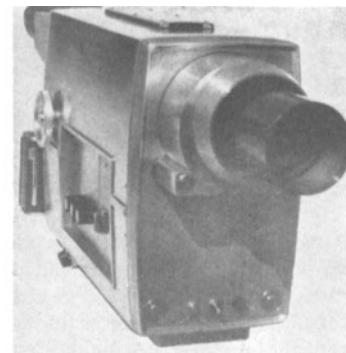


Fig. 3. John Hadland Imacon camera.

At Aldermaston they have been experimenting with discharge tubes as a means of providing the necessary light output. By using tubes of AWRE design and over-rating them, it is possible to produce the required intensity, but the tail of the flash is too long; in order to quench it the tube is designed to shatter, effectively killing the flash. Work is continuing on this system and photographs have been successfully taken using a C.P.5 28-frame camera operating at 1.6 million pictures/s. Mr. Oates demonstrated with slides the color-rendering obtainable with these flashtube light sources on high-speed Ektachrome developed at 160 ASA; he also said that good results can be obtained by developing the film as a negative material at 400 ASA.

J. R. Bagshaw of A. Reyrolle Ltd., Hebburn, in his paper "Laser-Schlieren of a Selfluminous Subject," described a study he had been making of the operation of air-blast circuit breakers using a schlieren system. To overcome the light from the intense arc produced in the circuit breaker it had been necessary to use a ruby laser and a filter system. A filter combination consisting of a Wratten Series 18B (violet) and a 29 (Red) transmitted the laser beam but absorbed virtually all the light emitted by the arc. Recording was carried out using a  $5 \times 4$  M.P.P. Technical Camera with an  $f/5.6$  lens, all synchronization being electronic.

Figure 1 shows a typical series of records and Fig. 2 a typical model blast switch.

D. M. Paul of the Physics Department, St. Andrews University, presented a paper entitled "Image-Tube Streak Photography of Raman Spectra." (A summary of the paper appears on the following page.) An S.T.L. image tube camera operating in the streak mode was used.

A. E. Huston of John Hadland (P.I.), Ltd., was the final speaker of the Conference. He described the John Hadland Imacon camera (Fig. 3) which features plug-in units to give various frame rates and streak writing speeds and gave a technical resume of the instrument.

The Conference closed at noon on April 12.

The following officers were appointed for 1967/68: Chairman, D. P. C. Thackeray; Vice-Chairman, N. Dombrowski; Treasurer, R. J. Cox; Secretary and National Delegate, G. H. Lunn.