

CONTENTS

	Page No.
Congress Organisation	11
National Delegates	12
Sponsoring Organisations	14
Session Chairmen	15
Editor's Note	16
Opening Address	17
Dr. I. Maddock	
Speech of Welcome	21
Sir Brian Flowers	
Invited Paper I	23
Picosecond pulse measurement and its scientific applications	D.J. Bradley
Invited Paper II	32
Picosecond image converter diagnostics	M. Ya. Schelev
Invited Paper III	41
New laser high-speed measurement techniques in aerodynamics (in German)	R. Schall
Invited Paper IV	54
A review of the current state of the art	J. Hadland
Session A1 - High-Speed and Ultra High-Speed Cameras	
Triggered rotating mirror camera	61
A.E. Huston, D.J. Bowley and K.A.F. Haynes	
Objective-technique: a method of observing very fast events in paraxial direction to the objective (in German)	M. Held
Fast electrodynamic shutter system for a six-frame camera	G.C. Damstra
Lenticular camera for high-speed stereoscopic photography	78
L.V. Akimakina, V.P. Belousov, O.F. Grebennikow and V.P. Gusev	

Contents

	Page No.
Session B6 - High-Speed Cameras	
A high-speed mechanical shutter driven by a gas motor	J.S. McVeagh and H.A. Newbery 83
Stereoscopic strobing of two high-speed cameras	A. De Volpi, R. Roddick, R. Brenner, R. Pecina, D. Travis and R. Daly 89
Image distortions arising in high-speed photography (in German)	W.P. Belousov, O.F. Grebennikov, S.M. Prowornow and B.N. Tarasow 95
Sessions A2 and A3 - Electro-Optical Cameras and Shutters	
The LLL compact, 10-psec streak camera - 1974 update	S.W. Thomas, J.W. Houghton, G.R. Tripp and L.W. Coleman 101
Synchroscan - a technique for the photography of repetitive picosecond pulses	R. Hadland, K. Helbrough and A.E. Huston 107
The Photochron II streak camera	P.R. Bird, D.J. Bradley and W. Sibbett 112
Picosecond chronography at X-ray wavelengths	P.R. Bird, D.J. Bradley, A.G. Roddie, W. Sibbett, M.H. Key, M. Lamb and C.L.S. Lewis 118
Image converters for ultra-high-speed photography	B.R.C. Garfield 124
The design of a new electron optics for a picosecond streak camera	G. Clement, C. Loty, J.P. Roux and C. Chancel 130
Very high gain image tube operated in the streak mode (in French)	C. Chancel, N. Fleurot and J.P. Gex 136
Application of ultra-fast high-resolution gated-image intensifiers to laser fusion studies	A.J. Lieber, R.F. Benjamin, H.D. Sutphin and G.H. McCall 144

Contents

		Page No.
Pockels cell shutter operating in the 100 picosecond range - applications to ultra high-speed interferometry	M. Blanchet and J.P. Gex	150
Ultra high-speed framing photo- graphs of laser produced plasmas using a picosecond optical shutter	G.B. Gillman and S.A. Ramsden	157
The microchannel plates: a survey of the possibilities of channel multiplier arrays in nano and picosecond detection and imaging	G. Eschard	163
Session A4 - Electro-Optical Cameras and Shutters		
Improvement of the performances of high-speed cinematography through the use of a proximity focusing microchannel image intensifier	R. Polaert and J. Rodière	170
A high-aperture, high-gain system for fast recording under low light level conditions	J.H.L. Ranson and A.E. Huston	178
A high-speed video recording system with immediate slow- motion and stop-action replay	R.E. Perkins	184
Studies of different recording systems associated with a pico- second streak camera	G. Jean-Francois, P. Nodenot, V.V. Korobkin, Yu.V. Korobkin, M.Ya. Schelev and A.V. Prokhindeev	190
Sessions B9 and B10 - Electro-Optical Cameras		
Ultra fast x-ray streak camera	L.W. Coleman and C.F. McConaghy	196
Lupentechnik - increase in resolution of optical set ups using image converter cameras	M. Held and P. Nikowitsch	202

Contents

		Page No.
The determination of shuttering efficiency of gated image tubes	A.E. Huston and D.J. Bowley	207
The determination of the properties of an underwater electrical discharge using high-speed photography	D. Simpson and R. Stirling	211
The application of image converter cameras to the investigation of industrial processes	J.R. Henney and R. Hadland	218
A universal image converter recorder of LVE-2 type	Yu.A. Drozhbin, G.V. Kolesov, V.B. Lebedev, B.M. Stepanov and T.S. Vyugina	223
Photometric measurements with an image converter streak camera	W.D. Friedman	228
A wide-range image-converter streak camera for quantum electronics	L.I. Andreyeva, M.M. Butslav, A.I. Chourbakov, B.Z. Gorbenko, S.A. Kaidalov, B.M. Stepanov and A.M. Tolmachev	235
 Sessions A5, A6 and A7 - Holography and Interferometry		
Interferometric measurement of three-dimensional dynamic stress distribution in plates (In German)	U. Soltész	240
Time-resolved spectroscopy	J.S. Courtney-Pratt	246
Optical and laser-interferometric investigations of an electron-beam controlled CO ₂ -laser (in German)	M. Hugenschmidt and K. Vollrath	247
Use of holographic interferometry for quantitative investigations of the deformation of the surface of a material impacted by a projectile (in French)	F. Albe, P. Smigielski and H. Fagot	253
Particle velocity measurements via high-speed holography (in French)	H. Royer	259

Contents

		Page No.
Three-dimensional visualisation by high-speed holography of the wake of a projectile launched at Mach 2 (in French)	H. Fagot, P. Smigielski and G. Simon	265
High-speed holography of vibrating objects and rapid events	T. Uyemura and Y. Yamamoto	271
Holography of high-speed events using a train of mode-locked pulses	D.J. Carley, M.A. Lowe, C.S. Norman, I.K. Pearce and J.D. Redman	277
Observational techniques related to differential interferometry	G. Smeets	283
Microholography: interferometric investigation of deformations of the eardrum of guinea pigs undergoing transient sound effects (In French)	P. Smigielski F. Albe, H. Fagot, A. Dancer and R. Franke	289
A special interference hologram camera for quick vibration analysis of drive units and car bodies	A. Felske and A. Happe	295
Shadow and interferometer investigations of low density gas flow by means of reconstructing a light wave front from a hologram	A.F. Belozarov, A.N. Berezkin, N.P. Mudrevskaya, L.T. Mustafina and A.I. Razumovskaya	301
Session B11 - Holography and Analysis		
Holographic cine interferometry of high-speed events	A.S. Dubovik, Yu.I. Filenko, V.M. Ginzburg, B.M. Stepanov and L.S. Ushakov	307
Investigations of stress waves in solids and fluid-solid systems with a real-time shadow optic method and digital electronic evaluation (In German)	E. Häusler and K. Lubert	313
Recording of time and other data on film in high-speed instrumentation cameras	L.M. Dearing and E. Shackleford	319

Contents

	Page No.
Universal high-speed 'waiting' type camera BCФK4	G.I. Belinskaya, A.S. Dubovik, I.A. Korolev and B.M. Stepanov 326
 Session A8 - Laser and Plasma Sources	
A multiple spark system incor- porating fibre optics and an electronic timer for projectile photography	P.W.W. Fuller and E.J.M. Wlatnig 330
Coherence effects on holographic interferometry	T. Uyemura and M. Yonemura 336
Spark light sources	L.E.N. Lim 342
 Session A11 - Continuous, Flash and X-Ray Sources	
Design of high voltage high frame rate cine flash radio- graphy system	F.M. Charbonnier, J.P. Barbour and L.C. Crouser 348
A flash tube for ultraviolet with less than 20 nanosecond rise time	C. Allingham, P.J. Dooley, V.I. Little, S. French and S. Majumdar 356
Xenon flash lamps of the bulb type	P.B. Newell, and H.E. Edgerton 364
Chronolite 3 - a confocal multiflash	H.G. Patzke 371
 Sessions A9 and A10 - Schlieren, Shadowgraph, Microscopy, Stereoecopy and Time-Resolved Spectroscopy	
Recording of schlieren pictures for flow visualization in rotating machines	G. Fertin 375
Schlieren and interferometric studies of T.E.A. Co ₂ laser produced plasmas	K. Rashidi and S.A. Ramsden 380
High-speed photography of particle tracers behind non- planar shocks	J.M. Dewey and D.K. Walker 386
A millisecond scanning spectro- graph for arc investigations	E.J. Boschman and G.C. Damstra 393

Contents

	Page No.
Color schlieren photography of short duration transient events	J.K. Vandiver and H.E. Edgerton 398
 Session A12 - Data Reduction and Image Analysis	
Instrumentation and techniques for a direct computer-aided analysis of drop and particle systems	M.J. Dix, H. Sawistowski and L.R.T. Tyley 404
Numerical determination of the mass attenuation coefficient of an object from a series of flash X-ray photographs (in French)	R. Oudin 408
Image recording and processing system in the field of electronic high-speed cinematography	J. Marilleau, G. Garcin, J.J. Lefebvre and R. Loichot 414
Semi automatic evaluation of locomotion variables from films obtained by high-speed cinematography	I. Fredricson, G. Dalin, S. Drevemo, G. Hjerten and K. Moen 420
Rapid access in high-speed photography	J.S. Courtney-Pratt 426
 Sessions A13, A14, A15, A16 and B12 - Applications	
The application of high-speed photographic techniques at the Rotherham works of the British Steel Corporation	L.S. Thickett 434
Ultrafast streak and framing technique for the observation of laser driven shock waves in transparent solid targets	C.G.M. Van Kessel, P. Sachsenmier and R. Sigel 437
High-speed photography of liquid jets	D.A. Gorham and J.E. Field 442
Application of high-speed photography to explosives research	M.M. Chaudhri, J.E. Field, M. Coley and J.T. Hagan 448
The fracture of glass by impact	A.C. Woodward and J.E. Field 455

Contents

		Page No.
Transient stress wave visualisation by holographic interferometry	E.R. Robertson and W. King	462
High-speed photographic techniques for small-scale explosive and ballistic studies	H.F. Swift	468
Study of welding arcs using high-speed photographic and optical techniques	J.C. Metcalf, M.B.C. Quigley and J.M. Webster	469
Application of holographic interferometry methods to investigation of the flow in a shock tube reflection nozzle	A. Shatilov, L. Mustafina, V. Ivanov and E. Yushkov	473
Study of shockwave-induced deformation in a metal bar by high-speed interferometry	M.P. Wright	482
Application of scattering holographic interferometers in the aeroballistic experiment	A.F. Belozerov, A.N. Berezkin, I.S. Zeylikovitch, S.A. Korchagin and V.T. Chernykh	489
Investigation of electric discharge between electrodes using high-speed photography	T.A. El-Khalafawy, M.M. El-Nicklawy, A.B. Bashara, M.A. El-Masry, M.B. Eteiba, M.S. Abo-Elilil and N.J. Rudnev	492
A simple camera-system for silhouette photography of projectiles in flight under daylight conditions	A.W.M. Van der Voort	495
High-speed photographic and holographic studies of burning fuel oil droplets in atomised sprays	J.M. Webster, R.P. Weight and E.G. Archerbold	501
About the production of shock waves by a dielectric spark discharge in liquids	R. Germer, W. Schaaffs and P. Krehl	504
Onset of flame oscillations and their suppression by electric fields	G.D. Salamandra, N.M. Wentzel and I.K. Fedoseyeva	511

Contents

		Page No.
Session B7 - Visualization Techniques		
Devices and methods of interferometry in ballistics.	G.I. Mishin, N.P. Mende, P.I. Kovalev and A.N. Mihalev	520
Luminous subjects photographed with auxiliary light	C.E. Miller and H.E. Edgerton	526
Schlieren photography of metallic diaphragm rupturing and shock formation processes	L.E.N. Lim	532
Quantitative schlieren measurements of boundary layer phenomena	B.W. Hannah	539
Precision measurements using high-speed photographic techniques	H.F. Swift	546
Sessions B13 and B14 - Late Papers		
Correlation of optical diagnostic techniques on exploding wire plasmas	J.L. Seftor, N.P. Econmou, D.N. Payton III, and R.S. Case, Jr.	547
High-speed image converter X-ray studies	G.I. Bryukhnevich, Yu.S. Kas'yanov, V.V. Korobkin, A.M. Prokhorov, B.M. Stepanov, V.K. Chevokin and M.Ya. Schelev	554
Picosecond X-ray streak camera studies	Yu.S. Kasyanov, A.A. Malyutin, M.C. Richardson and V.K. Chevokin	561
A high-speed schlieren study of laser-induced flame propagation in the presence of applied electric fields	J.R. Wilson and G.P. Tewari	569
Laser pulse diagnosis with a high-speed streak camera (In French)	C. Chancel, N. Fleurot, J. Garaude and J.P. Gex	574
Cinematography of fireball dynamics	D. Payton and R. Bigoni	580

Contents

	Page No.
Sessions B4 and B5 - Terminology	
Photonics: The profile of a new discipline	L.J. Poldervaart and C.G. Sluijter 585
On new elaborations in international terminology of high-speed photography and cinematography	A.A. Sakharov 592
Dictionary of high-speed cinematography (in French)	M.L. Andre 594
Papers supplied by authors but not presented at the Congress	
On the measurement accuracy in the study of high-speed events with large information entropy	V.V. Bacherikov, V.E. Kagain, Yu.A. Makarov and B.M. Stepanov 596
The concentration of the flash tube radiation for the high-speed photography of weakly reflecting objects	L.N. Bykhovskaya, G.D. Dorfman, L.B. Dunayevskaya, V.S. Feldman, I.M. Gurevitch and L.S. Sokolenko 599
Kinematics of a sugar-beet topping mechanism	J. Kalina 606
High-speed photography of a 'switch-on' collisionless shock wave	T.A. El-Khalafawy, M.M. El-Nicklaway, A.B. Bashara, M.A. El-Masry and N.J. Rudnev 612
Manyframe high-speed schlieren photography of shock waves in a ruby laser beam	A.S. Shikanov and Yu.A. Zakharenkov 616
Laser techniques in non-destructive testing (in German)	H. Steinbichler and H. Rottenkolber 621
Development of a dye laser for lighting in ultra rapid cinematography (in French)	J.L. Paradis 630
Author Index	635
Subject Index	638