Paper sheet moisture measurements by microwave phase perturbation techniques

R. G. BOSISIO, M. GIROUX & D. COUDERC, Journal of Microwave power, vol.5, 1970, pp.25–34

Moisture measurements have been made from the phase perturbation response of a microwave quarter-wave coaxial cavity by a wet paper sheet. Accuracies were ±0.3% in the range 0–10% and ±1.5% in the range 40–100%. These ranges corresponded with a linear response using a fixed frequency. The intermediate range was covered using a phase-frequency technique.

Microwave plasmas

D. A. JOHNSON, Journal of Microwave Power, vol.5, 1970. pp.17–22

Part 1 of a bibliography of 144 references on the subjects of microwave plasma heating and the applications and effects of plasmas.

Absorption of microwave power by plasmas

F. H. DORMAN & F. K. McTAGGART, Journal of Microwave Power, vol.5, 1970. pp.4–16

Absorption of microwave power at 900MHz by the gases He, Ar, H_2, N_2, O_2, CO_2, C_4H_{10} and Cl_2 in the plasma state passes through a maximum at a pressure characteristic of the gas in a range 1–80torr.

Effect of microwave oven on implanted cardiac pacemaker

G. R. KING ET AL, Journal American Medical Association, vol.212, 1970. p.1213

A patient with an implanted ventricular sensing heart pacemaker experienced a syncopal episode whilst having dinner in a restaurant which used microwave oven. Further studies showed that low level radiation at a distance of five feet from a 2450MHz oven could block the pacing activity of this type of pacemaker.

Biological effects of microwave and radio frequency radiation

S. F. CLEARY, Critical Reviews in Environmental Control, vol.1, June 1970. (Chemical Rubber Co.) pp.257–306. 131 refs. pp.452–4

A comprehensive up to date survey of all aspects of the interaction of microwaves and r.f. with biological systems. Mechanisms of interactions are given, together with detailed reviews of specific effects such as thermal, lenticular, testicular and genetic damage. A section is devoted to the measurements of power levels and to standard for human exposure.

Safety considerations in outdoor applications

P. H. DEITZ, Laser Focus, June 1970. pp.40–3

Prediction of eye damage from a laser beam is complicated by the difficulty of assessing the influence of atmospheric turbulence on the beam's energy distribution. Turbulence causes beam wander, spreading and scintillation. For example at one kilometer from a transmitter about 30% of a laser beam's cross sectional area may exceed the axial irradiance level at the transmitter.

Glass disc calorimeter for pulsed lasers

J. G. EDWARDS, Journal of Physics E, vol.3, 1970. pp.452–4

Polymer micro defects as the centres of destructive cracks induced by laser irradiation

M. B. AGRANAT ET AL, Nature, vol.226, 1970. pp.349–51

In this calorimeter the pulsed laser beam passes through two glass discus–one green (absorbing from 0.6–1.6μm) and the other clear. Thermocouples are attached to the two discs and the temperature difference is measured. This method enables 1% accuracy to be obtained at 10mJ input energy. For energies up to 0.1J any pulse length from 1s to 0.1ps can be used. The limiting power density at the glass is $40MWcm^{-2}$.

Thermal chemical damage in biological material under laser irradiation

C. HU & F. S. BARNES, IEEE Transactions, vol.BME-17, 1970. pp.220–9.

Describes mathematical model for thermol-chemical damage. Chemical rate equations for protein denaturization are used to predict radii damage for the case of a single hit. Results with egg white suggest that chemical reactions which result in colour or refractivity changes may be a good way of monitoring peak temperatures in the vicinity of the laser beam.

Hazards associated with microwaves and preventitive examinations of radar specialists

PLHAK, M., SERVUS, V., and SCHUBERTOVA, J., Vojenske zdravotnicke listy (Prague), vol.38, no.1. pp.7–9

Under laser radiation disc shaped cracks are formed in irradiated transparent dielectrics such as polymethyl-methacrylate, polystyrene and polycarbonate. The cracks are initiated at polymer micropores. Opened micropores may act as defects in subsequent irradiation.

Following a bibliographical survey of the contradictory findings obtained from animal experiments and observations

in the U.S.S.R. and U.S.A., the authors report on their own observations. Clinical examinations and laboratory tests conducted on radar technicians since 1964 revealed no anomalies, except in the case of one man with 13 years' exposure, in whom a slightly raised gamma-globulin level was observed. An enquiry into subjective symptoms of neurasthenia conducted by questionnaire among 20 technicians revealed htat the severity of such disorders was proportional to the length of employment. However, a high frequency of nervous disorders was also observed among a control group of 27 regular soldiers with 10 to 21 years' service in the army. (CIS abstract.)

Recommendations of laser safety conference

POWELL, C. H., & GOLDMAN, L., Archives of Environmental Health, vol.18, no.3. pp.448–52.

Review of the recommendations adopted at the Cincinnati conference designed to protect health of persons exposed to laser energy to control the environment of laser operations. Recommendations relate to: eye protection, environmental exposure, skin protection, electrical hazards, educational requirements of the biomedical engineer and industrial physicist, a central registry for laser safety data and accidents, control of laser hazards in the research laboratory, and the role of industry and official agencies. (CIS abstract.)

Laser problems related to the nation's health

POWELL, C. H. and BROWN, M. C., Archives of Environmental Health, vol.18, no.3. pp.391–3

Report of national survey of laser hazards, health services, number of persons employed in works using lasers, location of laser facilities within the plant and chemicals used in conjunction with them in industry. (CIS abstract).

Laser effects on the eye

CLARKE, A. M., HAM, W. T., GEERAETS, W. J., WILLIAMS, R. C., & MEULLER, H. A., Archives of Environmental Health, vol.18, no.3. pp.424–7

The authors attempt to establish data from which safe levels of illumination can be established for the eye. The article includes a graph showing the power density (in W/cm^2) necessary to cause minimal opthalmoscopically observable lesions and a table giving equilibrium time and threshold power densities calculated from thermal models. (CIS abstract.)

Laser damage thresholds for ocular tissues

PEPPERS, N. A., & HAMMOND, A.H. American Industrial Hygiene Association Journal, vol.30. pp.218–25

Linear thermal models indicate ranges over which thresholds increase with increasing exposure time and decreasing spot size. Reported thresholds depend on the damage criterion used. There are significant experimental uncertainties in determining energy distribution on the retina for both small and large spot sizes. Human threshold values extrapolated from animal data may be questionable, but human data are being collected. Graphs compare theoretical models and experimental threshold values and indicate recommended safe levels (CIS abstract.)

Microwaves, lasers and X-rays–adverse reactions due to occupational exposures

TERRILL, J. G., Archives of Environmental Health, vol.19. pp.265–71

Discusses the principles and characteristics of lasers and other microwave devices, some of their applications, and effects on the body. Heat produced in the body by the absorption of energy from radiation must be dissipated rapidly, as an excessive rise in temperature results in tissue damage. The sensation of warmth provides a warning for the body as a whole, but not for the eye, which is the most vulnerable part for laser radiation. Hands are the next most likely part of the body to receive exposures. The article describes research to establish microwave exposure concentration values and MAC levels, but points out that much more research is still needed. (CIS abstract.)

Retinal burns from intense light sources

BARTLESON, C. J., American Industrial Hygiene Association Journal, vol.29. pp.415–24

The relative amount of radiant energy impinging upon the human eye which will be absorbed, transmitted, and reflected in the ocular structure depends largely on the wavelength of energy involved. Little reflection occurs in general at the outer surface of the eye (cornea). Energy absorbed is transformed into heat, and a burn can occur in the chorioretinal structures if sufficient heat is produced. After briefly describing the optical and anatomical characteristics of the human eye and thermal damage to the retina, the author discusses thresholds for safe levels of irradiation. A method of computing retinal irradiance is discussed. There is no single value of radiant exposure than can be defined as a threshold. (CIS abstract.)

Laser eye protection goggles

SCHREIBEIS, W. J. American Industrial Hygiene Association Journal, vol.29. p.504.

Tabular presentation of the optical characteristics of a number of eye protective goggles for laser beams (manufacturer, optical density values, ultraviolet protection, cost, number and thickness of filters, visible light transmission). Average cost of a pair of goggles is about $35 to $50. (CIS abstract.)