



Lens Surfaces

In this paper a method is described by which evaporated lithium fluoride can be selectively deposited on lens surfaces to make the lenses free from spherical aberration. The experimental procedure, carried out in a vacuum, was to rotate the lens on its axis and control the thickness of the deposit by a diaphragm between the lens and the source of lithium fluoride vapor. A simplified theory is given for calculating the thickness required to correct any given lens. It is shown that the deposit cross section is the same as that of a Schmidt camera correction plate. The method is limited by the maximum thickness of lithium fluoride that can be deposited before surface roughness begins to scatter light appreciably; but the effective thickness can be increased by using alternate layers of lithium fluoride and collodion.

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Preparation of Aspherical Refracting Optical Surfaces by an Evaporation Technique

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Fission

For several years the heavy elements down to actinium (atomic number 89) have been known to undergo fission upon bombardment by fast neutrons. Neutron sources available previous to the operation of the 184-inch Berkeley cyclotron provided neutron beams of energies up to about 20,000,000 electron volts. The 184-inch cyclotron emits a beam of neutrons of average energy 90,000,000 electron volts. The availability of high energy neutrons suggested the possibility of fission occurring in other heavy elements. However, the heavy elements of atomic numbers 89 down through 84 are not suitable for investigation because of their high specific radioactivity. Bismuth was a convenient element to investigate and it was found to undergo fission upon bombardment by 90,000,000-electron-volt neutrons. The threshold for fission in bismuth was found to be about 40,000,000 electron volts. Lead, thallium,

mercury, gold, and platinum were also found to be fissionable with increasingly higher thresholds and lower cross sections.

An application of this research has been the construction of several high energy neutron detectors consisting of ionization chambers containing a multiplicity of plates of aluminum coated with bismuth. The fission pulses from the detectors are amplified in the conventional way and recorded by scaling circuits and pulse-registering devices. The efficiency of the detectors is low, but they are useful for neutron-beam attenuation measurements and monitoring purposes. The advantages of the bismuth-fission neutron-detectors include their complete lack of response to neutrons of energies less than about 40,000,000 electron volts, negligible background, and immediate indication of the presence of high-energy neutrons.

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Fission of Elements from Pt to Bi by High Energy Neutrons

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Aerodynamics and Acoustics

This paper illustrates that certain techniques are common to acoustics and supersonic aerodynamics. The general problem of the aerodynamicist is to find the pressure distribution over a body placed in a moving stream. In subsonic flow it is generally necessary to introduce the concepts of vorticity and circulation; but in supersonic flow the introduction of these concepts is not necessary and the problem is essentially acoustical.

Two examples of problems in supersonic aerodynamics which are susceptible to acoustical attacks are the calculations of (1) the aerodynamic forces on an oscillating airfoil, and (2) the "wave drag" of three-dimensional airfoils at zero lift. The results of the first problem are necessary for solving the "flutter problem." The second problem is concerned with the energy transformed into wave motion of the surrounding air by passage of the wing.

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Acoustical Methods in Supersonic Aerodynamics

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