coincides with the voltage for the onset of corona at a critical pressure. Generally, the positive static breakdown voltage is higher than the impulse value below this critical pressure so that field modification involving time is an important factor. It has been argued[2] that with impulses only electrons contribute to the lowering of the field at the highly stressed electrode while with static voltages there is an additional contribution by negative ions. This leads to the conclusion that for any gas at a particular percentage of E/p above $(E/p)_{\alpha=\eta}$ the difference between the impulse and the static values is related to the magnitude of $\alpha/(\alpha-\eta)$. Fig. 2 gives plots of $\alpha/(\alpha-\eta)$ for sulphur hexafluoride, difluorodichloromethane and air against the percentage increase of E/p above $(E/p)_{\alpha=\eta}$; the values for carbon tetrafluoride lie in the region of the curve for air. Experimental data indicate that the difference between the static and impulse breakdown voltage is greater for sulphur hexafluoride than for difluorodichloromethane; for air and carbon tetrafluoride the impulse breakdown voltages exceed by a small amount the static values, possibly due to the effect of time-lags influencing the impulse breakdown.

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Periodicity in Sea Roughness and Origin of Microseisms

VARIOUS workers have tried measuring the roughness of the sea by observing wave heights at a particular position as well as by compiling wave profiles along large distances by air observations. Glitter photographs of the sea surface have also been statistically analysed for finding the relation between development of wavelets and wind velocity. It has been recognized that description of sea roughness is very difficult by any of the above means. On the other hand, it is well known that radar clutter increases in amplitude with sea roughness, and estimation of sea roughness should be possible by observations of radar clutter. Recently, one aspect of analysis of sea roughness became imperative in view of the hypothesis that microseisms may be caused by means of interaction of wind and sea roughness. According to such ideas, the periods observed in microseisms should correspond to any autocorrelative periods in sea roughness.

A shore-based naval 10-cm. radar was used for the study of radar clutter. The echoes were observed from about 200 ft.^{2} area of sea surface at a certain distance by giving attention only to 1-mm. width at 2,000 yd. range of '*A*' type scan, the angular width of the radar beam being $2\frac{1}{2}°$. The rest of the '*A*' type scan was blocked by black paper. The vertical amplitudes in the narrow width of 1 mm. on the screen gives a record of the intensity of the clutter. These amplitudes were photographed by means of a continuously moving film using a speed of 7·4 in. per min. In the absence of an automatic autocorrelation meter, the amplitudes were read manually at 0·38-sec. intervals and an autocorrelogram was computed. The autocorrelogram showed strong periods of 0·8 sec. and 4·6 sec. There was an indication of a weak period also at 1·2 sec. According to the senior author's hypothesis, periods in sea roughness produce corresponding periods in eddy viscosity at the sea-surface. This causes periodic changes in wind-stress over the sea provided the winds are cyclonic or suitably oriented near a coast line. Such changes cause pulsations in pressure over wide areas at the sea-bottom. On the other hand, according to Longuet-Higgins's theory[2], standing waves, which might be regarded as corresponding to double the period brought out by any sea roughness analysis, cause direct second-order pressure effects of double frequency on the sea bottom. The standing waves of this theory are not likely to be seen always by the usual methods of observation of sea surface. According to the standing-wave theory, simultaneous existence of suitably oriented wind at the originating area in question is not essential.

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Refraction of Microseisms

IT is well established now that microseisms, the small tremors of varying intensity (in the range of 2–10 sec. period and of the order of a few microns in amplitude) recorded as more or less a permanent background by seismographs, are caused by sea waves associated with cyclonic depressions. The possibility of using these waves for location and tracking of storms has been investigated by many workers, and various techniques for estimating the direction of arrival have been put forward. But as the accuracy of estimation of direction of arrival is improved, corrections have to be applied to allow for the refraction of the waves due to variations in the velocity of propagation along the path from the generating area to the recording station. Microseisms are surface waves of the Rayleigh and Love type, and hence can be affected by variations in the geological structure of the Earth's crust and the changes in ocean depth along the path. While it is very difficult to estimate corrections for the geological configuration of the Earth's crust, the effect due to ocean depth can be calculated.

The effect of coupling between the ocean and the sea bottom on Rayleigh waves has been studied by Stoneley[1], and many workers have calculated the velocity of the modified Rayleigh waves in a uniform elastic sea bed, the ocean being regarded as a homogeneous compressible medium. As the present techniques for the direction of arrival of microseisms consist of using only the Rayleigh wave component, the refraction due to the Stoneley effect can be estimated.

Darbyshire[2,3] used this idea first and constructed refraction diagrams for Bermuda and the British Isles for microseisms arriving from various directions. The wave-fronts were assumed straight and parallel far out in the sea, and successive fronts were drawn at convenient intervals using velocities appropriate to the particular ocean depth. A method of geo-