PHYSICS

Burst-Type Signal from Small-Field Aurora

Photoelectric observations of luminosity fluctuations in small-field aurora have already been reported[1]. This communication illustrates some cases of burst-type signal recorded in two channels at Saskatoon (52·1° N., 106·6° W.). As briefly outlined in the earlier report, signals from two fields each 0·55° in size and separated from each other by 3° were recorded using a two-channel Sanborn recorder.

Fig. 1 *a*, *b* and *c* shows the signals from different auroral forms. The signal-burst has a pulse-like structure. These pulses may be sharp as well as broad. There could be one or several pulses in a burst. The pulse-length has a range of 0·5–5 sec. and the pulse recurrence time varies from 0·5 to 10 sec. The duration of the signal is 60–80 sec. The auroral form as visually observed in each of the three cases was of intensity II–III according to the international brightness coefficient scale or corresponding to 10–100 kilo rayleighs.

Fig. 2 *a* and *b* shows the signal from an unusual pulsating form. The intensity of this form as observed visually was only I–II or 1–10 kilo rayleighs. The signal looks like a combination of several bursts having pulse-like structure with relatively longer smooth oscillations. These low-amplitude short pulses last 0·1–0·3 sec. with recurrence time in the range 0·1–0·5 sec. The relatively longer oscillation periods vary between 4 and 5 sec. and less sometimes. This type is a less frequently recorded signal. When recorded it is seen to last for several minutes.

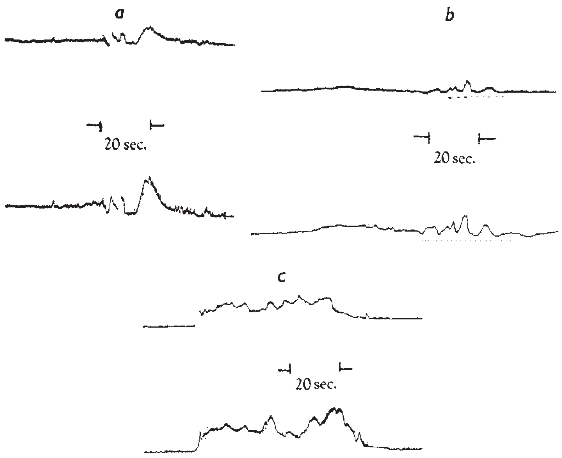

Fig. 1. *a*, Signal from a flaming aurora; *b*, signal from a corona; *c*, signal from a rayed band

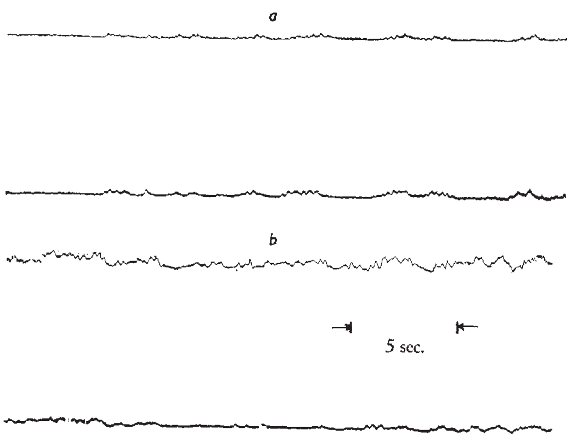

Fig. 2. *a* and *b*, Signal from a pulsating aurora

The similarity in the signal-pattern in the two channels is striking. Quiescent forms of aurora are not seen to give this type of signal in the two channels. In the cases of active forms illustrated in Fig. 1, possibly but not certainly, the effect of simultaneous intensity coruscations and motion might be involved. Perhaps, the excitation processes have also something to do particularly in the type of signal as in Fig. 2.

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[1] Iyengar, R. S., and Shepherd, G. G., *Canad. J. Phys.*, **39**, 1911 (1961).

Heating in Capillary Flow

The temperature profile in an essentially Newtonian liquid in laminar flow in a capillary has been measured experimentally. Previously the phenomenon of capillary heating (that is, heat produced by the internal friction of liquids in flow in a capillary) had been the subject of extensive theoretical treatment[1,2]; but with little experimental verification. These experiments show that the system is essentially adiabatic, in contradiction to widespread belief that the 'isothermal wall' condition existed.

Measurements were made on a mineral oil thickened with 3 per cent polyisobutylene, with a viscosity of 1 poise. The degree of non-Newtonian behaviour at the shear-rates used is insignificant. Stainless steel, conically tipped capillaries were used and the ther no-couple was made of very fine (0·003 in.) iron and constantan wire. The thermocouple was mounted on a microscope feed and could be moved across the diameter of the stream in increments of 0·0002 in. The temperature measured was, of course, some integrated temperature over an increment of the

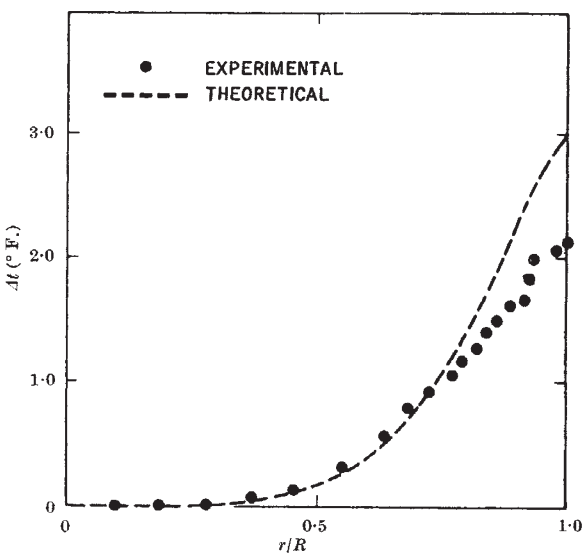

Fig. 1