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— Special Study Group 4—93

Wave propagation in refractive media

Propagation d'onde en milieu réfringent

President : P.A. Forsyth (Canada)

I. Program of Activities

Further improvements in geodetic measurements will depend to a large extent upon overcoming the unwanted effects imposed on electromagnetic waves by the inhomogeneous atmosphere. There are a number of these effects which enter in different ways into the various techniques for geodetic measurements. All of the effects can be described broadly as being due to refraction in the neutral atmosphere or in the ionosphere. It is important to review current research and, where necessary, to stimulate new research of a fundamental kind in order that the physical processes be well understood. This understanding will provide a sound basis for the introduction of techniques to ameliorate the difficulties introduced by the atmosphere into contemporary geodetic measurements of high precision.

The *task* of SSG 4.93 is to study the current state of knowledge and, where necessary, to extend that knowledge in order to achieve a sufficient knowledge of the physical basis of refractive effects which influence geodetic measurements.

In order to reach this comprehensive understanding the various aspects can be studied separately under the following headings :

A : The physical causes of refraction :

- a) Water vapour / temperature.
- b) Ionization.

B : The large—scale refraction of radio waves :

(This is taken to be the regime where ray optics can be applied).

- a) In the troposphere.
- b) In the ionosphere.

C : The effects of small scale irregularities :

- a) In the troposphere.
- b) In the ionosphere

D : The statistical description of irregularities :

- a) In the troposphere.
- b) In the ionosphere.

E : Modelling of propagation in refractive media :

- a) Ray tracing in large-scale media.
- b) Diffraction theory applied to turbulent media.

F : Effects of refractive media on :

- a) Doppler measurements.
- b) Group delay systems.
- c) Phase measurements.

II. List of Members

P.A. Forsyth	(Canada), <i>president</i> .	D.C. Hogg	(U.S.A.)
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L.A. Hajkowicz	(Australia)	R. Langley	(Canada)
G.K. Hartmann	(Fed. Rep. of Germany)	R. Leitinger	(Austria)
Y.N. Huang	(China)	A.R. Webster	(Canada)