INDEX OF DEFINITIONS OF THE MORE IMPORTANT SYMBOLS

$\mathscr{H}_x, \mathscr{H}_y, \mathscr{H}_z$	components of $\mathscr{H}$	*page* 20
$h, h(f)$	phase height	150
h_0	height of base of ionosphere	150
$h', h'(f)$	equivalent height of reflection	149
$\mathscr{I}$	imaginary part of	
i	$\sqrt{(-1)}$	
$\mathbf{J}$	current density in wave	14
k	$\omega/c = 2\pi/\lambda = 2\pi f/c$ propagation constant in free space	20
k_p	value of k at the penetration frequency	365
l	x-direction cosine of $\mathbf{Y}$, opposite to earth's magnetic field (also used with other meanings)	27
$\mathbf{M}$	susceptibility matrix	29
$M_{i,j}\ (i,j = x,y,z)$	elements of $\mathbf{M}$	29
$\mathscr{M}$	ray refractive index	255
m	y-direction cosine of $\mathbf{Y}$, opposite to earth's magnetic field (also used to denote an integer)	27
$\mathfrak{m}, \mathfrak{m}_e$	mass of electron	24, 32
$\mathfrak{m}_i$	mass of ion	32
N	number of electrons per unit volume	4
N_e, N_i	number of electrons and ions, respectively, per unit volume	32
n	z-direction cosine of $\mathbf{Y}$, opposite to earth's magnetic field (also used to denote an integer, and with other meanings)	27
$\mathfrak{n}$	(complex) refractive index	18, 38
$\mathfrak{n}'$	(complex) group refractive index	170
$\mathbf{P}$	electric polarisation	14
P_x, P_y, P_z	components of $\mathbf{P}$	27
P	phase path (usually for oblique incidence)	173
P'	equivalent path (usually for oblique incidence)	173
Q	effective value of q	344
q	solution of Booker quartic equation (also used with other meanings)	121, 175
$\mathscr{R}$	real part of	
R	reflection coefficient	ch. 7
R_0, R_1, R_2, R_3	values of R in specified conditions	ch. 7
$\mathbf{R}$	reflection coefficient matrix	90
$_\parallel R_\parallel, {}_\parallel R_\perp, {}_\perp R_\parallel, {}_\perp R_\perp$	elements of $\mathbf{R}$	89
r	used to denote an integer, and with other meanings	
S	$\sin\theta_I$, sine of angle of incidence	85, 121

β	coefficient of q^3 in Booker quartic	*page* 122
	(also used with other meanings)	
γ	coefficient of q^2 in Booker quartic	122
	arc tan ρ_o	51
	(also used with other meanings)	
δ	coefficient of q in Booker quartic	122
ϵ	coefficient of q^0 in Booker quartic	122
	(also used for arbitrarily small quantity, and with other meanings)	
ϵ_0	electric permittivity of free space	11
$\epsilon_1, \epsilon_2, \epsilon_3$	parameters in Epstein theory	376
ζ	scaled value of height z (the method of scaling depends on the problem)	
	(also used with other meanings)	
Θ	angle between earth's magnetic field and vertical	119
	angle between earth's magnetic field and wave normal when wave normal is vertical	50
ϑ	angle between earth's magnetic field and wave normal when wave normal is oblique	245
θ	angle between wave normal and vertical, within ionosphere	121
θ_I	angle of incidence; value of θ below ionosphere	97
θ_R, θ_T	angles of reflection and transmission at sharp boundary	97
λ	wavelength in free space	20
λ_p	λ at penetration frequency	365
μ	real part of refractive index	41
μ_o, μ_x	μ for ordinary and extraordinary waves respectively	199
μ'	group refractive index	148
μ'_o, μ'_x	μ' for ordinary and extraordinary waves respectively	201
μ_0	magnetic permittivity of free space	11
ν	collision frequency for electrons	6, 25
ξ	scaled value of height z (similar to ζ)	
$\mathbf{\Pi}$	Poynting vector	22
$\bar{\mathbf{\Pi}}$	average Poynting vector	23
$\bar{\Pi}_x, \bar{\Pi}_y, \bar{\Pi}_z$	components of $\bar{\mathbf{\Pi}}$	44
ρ	wave polarisation	47
	(used with subscripts to denote polarisation of specified waves)	
σ	scaling factor in Epstein profiles	375
	wave polarisation referred to axes at 45° to magnetic meridian	434
	(also used with other meanings)	

Cambridge University Press
978-0-521-11439-4 - Radio Waves in the Ionosphere: The Mathematical Theory of the Reflection of Radio Waves from Stratified Ionised Layers
K. G. Budden
Index
More information

NOTES ADDED IN SECOND PRINTING

Note 1. The equivalent height of reflection for a parabolic profile of electron density is given by the expressions (17.54) and (17.56). In the derivation it was assumed that the two asymptotic solutions (17.32) can be taken as the upgoing and downgoing waves. But these solutions should be multiplied by an asymptotic series which was intentionally omitted from (17.32). For the process to be valid it is necessary that the ratio of the second to the first term in the series shall be small at the top and bottom of the layer, which leads to the condition $|\frac{1}{2}n(n-1)/\zeta_a^2| \ll 1$. This is violated when $|D|$ (equation (17.43)) is large, and then the full wave solutions (17.54) (17.56) may not agree with the ray theory solutions (10.33) and (10.37). The discrepancy increases as the difference Δf (17.47), between the penetration frequency and the wave frequency is increased. The author is indebted to Dr. Kenneth Davies for pointing out this possibility.

Note 2. In §23.4 the assumption that the extraordinary wave has polarisation $1/\rho_A$ is valid only when the plane of propagation is the magnetic meridian plane, that is for propagation from magnetic north to south or south to north. The theory for other directions of propagation has been given by Budden, K. G. and Jull, G. W., 1964, *Can. Journ. Phys.*, **42**, 113.

The author is greatly indebted to numerous colleagues who, in correspondence, reviews or personal discussion, have pointed out errors in the first printing.

Cambridge University Press
978-0-521-11439-4 - Radio Waves in the Ionosphere: The Mathematical Theory of the Reflection of Radio Waves from Stratified Ionised Layers
K. G. Budden
Index
More information

SUBJECT AND NAME INDEX

Page numbers in bold type refer to definitions or descriptions.

Cambridge University Press
978-0-521-11439-4 - Radio Waves in the Ionosphere: The Mathematical Theory of the Reflection of Radio Waves from Stratified Ionised Layers
K. G. Budden
Index
More information