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VOLUME 6: 1911–1919

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SCIENTIFIC PAPERS

BY

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VOL. VI.

1911—1919

CAMBRIDGE
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PREFACE

THIS volume completes the collection of my Father's published papers. The two last papers (Nos. 445 and 446) were left ready for the press, but were not sent to any channel of publication until after the Author's death.

Mr W. F. Sedgwick, late Scholar of Trinity College, Cambridge, who had done valuable service in sending corrections of my Father's writings during his lifetime, kindly consented to examine the proofs of the later papers of this volume [No. 399 onwards] which had not been printed off at the time of the Author's death. He has done this very thoroughly, checking the numerical calculations other than those embodied in tables, and supplying footnotes to elucidate doubtful or obscure points in the text. These notes are enclosed in square brackets [] and signed W. F. S. It has not been thought necessary to notice minor corrections.

RAYLEIGH.

Sept. 1920.

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* [1914. It would have been in better accordance with usage to have said “of Relative Index differing little from Unity.”]

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(INCLUDING THE ERRATA NOTED IN VOLUME V. PAGE XIII.)

Page viii, line 4. } For end lies read ends lie.
 ,, 64, line 8. }
 ,, 86, last line. For 1882 read 1881.
 ,, 89, line 10. Insert comma after maximum.
 ,, 144, line 6 from bottom. For D read D_1 .
 ,, 324, equation (8). Insert negative sign before the single
 integral. } And Theory of Sound, Vol. I.
 ,, ,, line 2 from bottom. For (1) read (5). } (1894), p. 477, equation (8) and
 ,, 325, line 10. For $-nVH$ read $+n_pVH$. } last line, and p. 478, line 12.
 ,, 442, line 9. After $\frac{\rho' - \rho}{\rho'}$ insert y .
 ,, 443, line 9. For (7) read (8).
 ,, 443, line 10. For η read ξ .
 ,, 446, line 10. For ϕ read ϕ' .
 ,, 448, line 5. For v read c .
 ,, 459, line 17. For 256, 257 read 456, 457.
 ,, 492, line 7 from bottom. For $r\sqrt{2n}$ read $r/\sqrt{2n}$.
 ,, 494, lines 10 and 12. For $-\frac{2mr^2}{n^2 - 4m^2} \cos 2\theta$ read $+\frac{2mr^2}{n^2 - 4m^2} \cos 2\theta$.
 ,, 523, line 9. For n/λ read n/k .
 ,, 524. In the second term of equations (32) and following for ΔK^{-1} read $\Delta \mu^{-1}$.
 ,, 525, line 11. For f read f_1 .
 ,, 526, line 13. For $f : g$ read $f_1 : g_1$.
 ,, 528, line 3 from bottom. For e^{int} read $e^{i(int - k r_0)}$.
 ,, 538, line 11 from bottom. This passage is incorrect (see Vol. vi. Art. 355, p. 41).
 ,, 556. In line 8 after (15) add with $s\phi - \frac{1}{2}\pi$ for $s\phi$; in line 9 for δA_s read $\delta A_s'$; and for line
 10 substitute $+\delta A_s'$ as $\{\cos \frac{1}{2}s\pi + \cos(\frac{1}{2}s\pi + s\pi)\} F$.
 Throughout lines 12—25 for $A_s, A_1, A_2, \dots A_6, \delta A_s$ read $A_s', A_1', A_2', \dots A_6', \delta A_s'$;
 for $\sin \frac{1}{2}s\pi$ read $-\cos \frac{1}{2}s\pi$; and reverse the signs of the expressions for A_2', A_4', A_6' .
 Similarly, in Theory of Sound, Vol. I. (1894), p. 427, substitute $s\phi + \frac{1}{2}\pi$ for $s\phi$ in (32)
 (see p. 424), and in lines 11—26 for $A_s, A_s, \delta A_s$ read $A_s, A_s', \delta A_s'$, and for \sin read
 $+\cos$. Also in (43) and (47) for $s^2 - s$ read $s^3 - s$. [In both cases the work done corre-
 sponding to δA_s vanishes whether s be odd or even.]

„ 197, line 19. *For nature read value.*
 „ 240, line 22. *For dp/dx read dp/dy .*
 „ 241, line 2. *For du/dx read du/dy .*
 „ 244, line 4. *For k/n read n/k .*
 „ 323, lines 7 and 16 from bottom. *For Thomson read C. Thompson.*
 „ 345, line 8 from bottom. *For as pressures read at pressures.*
 „ 386, lines 12, 15, and 19. *For $\cos CBD$ read $\cos CBB'$.*
 „ 389, line 6. *For minor read mirror.*
 „ 414, line 5. *For favourable read favourably.*
 „ 551, first footnote. *For 1866 read 1886.*

ERRATA

xv

VOLUME III.

Page 11, footnote. *For has read have.*

- „ 92, line 4. *For Vol. I. read Vol. II.*
- „ 129, equation (12). *For $e^{u(t-x)} dx$ read $e^{u(t-x)} du$.*
- „ 162, line 19, and p. 224, second footnote. *For Jellet read Jellett.*
- „ 179, line 15. *For Provostaye read De la Provostaye.*
- „ 224, equation (20). *For 2χ read χ .* } *And Theory of Sound, Vol. I. (1894),*
- „ „ second footnote. *For p. 179 read p. 343.* } *p. 412, equation (12), and p. 423 (footnote).*
- „ 231, line 5 of first footnote. *For 171 read 172.*
- „ 273, lines 15 and 20. *For $\{\phi(x)\}^2$ read $\int_{-\infty}^{+\infty} \{\phi(x)\}^2 dx$.*
- „ 314, line 1. *For (38) read (39).*
- „ 326. In the lower part of the Table, under Ampton *for $c^b + 4$ read $e^b + 4$* , and under Terling
 (3) *for $b^b + 6$ read $b + 6$* (and in *Theory of Sound*, Vol. I. (1894), p. 393).
- „ 522, equation (31). *Insert as factor of last term $1/R$.*
- „ 548, second footnote. *For 1863 read 1868.*
- „ 569, second footnote. *For alcohol read water.*
- „ 580, line 3. Prof. Orr remarks that a is a function of r .

VOLUME IV.

- „ 14, lines 6 and 8. *For 38 read 42.*
- „ 267, lines 6, 10, and 20, and p. 269, line 1. *For van t' Hoff read van 't Hoff.* Also in
 Index, p. 604 (the entry should be under Hoff).
- „ 277, equation (12). *For dz read dx .*
- „ 299, first footnote. *For 1887 read 1877.*
- „ 369, footnote. *For 1890 read 1896.*
- „ 400, equation (14). A formula equivalent to this was given by Lorenz in 1890.
- „ 418. In table opposite 6 *for $\cdot 354$ read $\cdot 324$.*
- „ 453, line 8 from bottom. *For $\frac{2}{n-1}$ read $-\frac{2}{n-1}$.*
- „ 556, line 8 from bottom. *For reflected read rotated.*
- „ 570, line 7 (Section III). *For 176 read 179.*
- „ 576, line 7 from bottom. } *For end lies read ends lie.*
- „ 586, line 20. }
- „ 582, last line. *For 557 read 555.*
- „ 603. *Transfer the entry under Provostaye to De la Provostaye.*
- „ 604. *Transfer the entry Π 553 from W. Weber to H. F. Weber.*

VOLUME V.

- „ 43, line 19. *For (5) read (2).*
- „ 137, line 14. μ is here used in two senses, which must be distinguished.
- „ 149, line 3. *For P_0 read P_1 .*
- „ 209, footnote. *For XLX. read XIX.*
- „ 241, line 10 from bottom. *For position read supposition.*
- „ 255, first footnote. *For Matthews read Mathews.*
- „ 256, line 6. *For 1889 read 1899.*
- „ 265, line 16 from bottom. *For § 351 read § 251.*
- „ „ 15 „ „ *For solution read relation.*
- „ 266, lines 5 and 6, and *Theory of Sound*, § 251. An equivalent result had at an earlier date
 been obtained by De Morgan (see Volume VI. p. 233).
- „ 286, line 7. *For a read x .*

VOLUME V—*continued*.

- Page 364, title, and p. ix, Art. 320. *After* Acoustical Notes *add* vii.
 „ 409, first line of P.S. *For* anwer *read* answer.
 „ 444, line 2 of footnote. *For* p. 441, line 9 *read* p. 442, line 9.
 „ 496, equation (4). *Substitute* equation (19) on p. 253 of Volume vi. (*see* pp. 251—253),
 reading $\left(\frac{l'}{l} - \frac{l}{l'}\right)$ *for* $\left(\frac{l'}{l} + \frac{l}{l'}\right)$.
 „ 549, equation (48). *For* e^{-ikr} *read* e^{-ikr_0} .
 „ 619, line 3. *Omit* the second expression for $J_n(n)$.
 „ „ lines 11, 12, 19. *For* 2·1123 *read* 1·3447.
 „ „ line 12. *For* 1·1814 *read* 1·8558.
 „ „ line 19. *For* ·51342 *read* ·8065.

*See the first footnote on p. 211 of
 Volume vi.*

VOLUME VI.

- „ 4, first footnote. *After* equation (8) *add*:—*Scientific Papers*, Vol. v. p. 619. *See also* Errata
 last noted above.
 „ 5, line 3. *For* $(2n+1)z^2=4n(n+1)(n+2)$ *read* $z^2=2n(n+2)$, so that z^2 is an integer.
 „ 11, last footnote. *For* § 230 *read* § 250 (fourth edition).
 „ 13, equation (17). *For* $\frac{3}{4}k^4a^4$ *read* $\frac{5}{4}k^4a^4$.
 „ 14, footnote. *For* § 247 *read* § 251 (fourth edition).
 „ 78, footnote. *Add*:—*Scientific Papers*, Vol. v. p. 400.
 „ 87, footnote. *Add*:—Thomson and Tait's *Natural Philosophy*, Vol. i. p. 497.
 „ 89, second footnote. *For* 328 *read* 329.
 „ 90, second footnote. *Add*:—*Math. and Phys. Papers*, Vol. iv. p. 77.
 „ 138, footnote. *For* 1868 *read* 1865, and *for* Vol. ii. p. 128, *read* Vol. i. p. 526.
 „ 148, footnote. *Add*:—*Scientific Papers*, Vol. iv. p. 407, and this Volume, p. 47.
 „ 155, footnote. *For* Vol. iv. *read* Vol. iii.
 „ 222, second footnote. *For* Vol. ii. *read* Vol. i. And in *Theory of Sound*, Vol. i. (1894), last
 line of § 207, *for* 4·4747 *read* 4·4774
 „ 223, line 5 from bottom. *For* 0·5772156 *read* 0·5772157.
 „ 225, line 1. *For* much greater *read* not much greater.
 „ „ line 6 from bottom. *For* 13·094 *read* 3·3274.
 „ 253, equation (19). *For* $\left(\frac{l'}{l} + \frac{l}{l'}\right)$ *read* $\left(\frac{l'}{l} - \frac{l}{l'}\right)$.
 „ 259, line 5. *For* $-\frac{2}{a} \frac{dy}{dz}$ *read* $+\frac{2}{a} \frac{dy}{dz}$.
 „ 263, equation (24). *For* $\frac{\omega^2 a}{2T}$ *read* $\frac{\omega^2 a^3}{2T}$.
 „ „ (25). *For* $\left(1 - \frac{3r^2}{a^2}\right)$ *read* $\left(1 + \frac{3}{4} \frac{r^2}{a^2}\right)$.
 „ 282, footnote. *For* p. 77 *read* p. 71.
 „ 303, line 17. *For* $\sqrt{(bvc/\kappa)}$ *read* $\sqrt{(bvck)}$.
 „ 307, line 8. *For* $\frac{d\phi}{dy}$ *read* $-\frac{d\phi}{dy}$.
 „ 315, line 2. *Delete* 195.
 „ 341, second footnote. *Add*:—[This Volume, p. 275].
 „ 351, line 13 from bottom. *For* Tgp *read* $T/g\rho$.