

Technical College, Finsbury,
Leonard Street, City Road.

London, E.C.

12/70

16th Dec 1893

Dr Fitzgerald

We wish we could think of
your soon coming to London.

After the reading of Larmor's paper
at the R.S. he came to us to dinner
& as Lodge was stopping with us
there was interesting conversation
till about 3^o in the morning
Of this conversation I understood

about one sentence in ten only
but I was sufficiently impressed
with Larmor's wonderful learning.
He seems to have read every tract
ever published ^{applied} on Mathematics
He said he thought he could
come from Cambridge to have a
talk with you in London, next
time you came.

We are going on Wednesday
next to Eastbourne for a fortnight.

I am setting about some ex-
periments on the ^{heat} emissivity
between water & metal - I need
it in my calculations & is not

to be found in the books. Ayrton
 + I found $\epsilon = .005$ between stone
 & water. A Mr Morrison made exp^s
 on boiling off water by steam - Jac.
 Keting the vessel in which it was
 I find from his results $\frac{1}{e_1} + \frac{1}{e_2} = 10.6$
 for the two surfaces of his metal

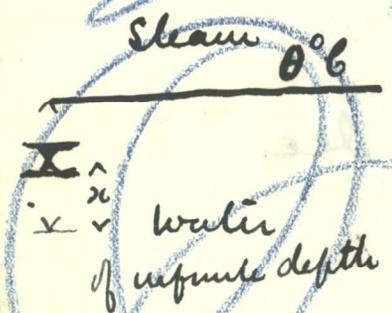
Now as Mr Farlane had between air
 & Copper $e = .0002$ or thereabouts
 & I find in a rough way that the
 emissivity of water - metal is about
 .04 + upwards. I think that Morrison's
~~was~~ steam - metal surface
 was steam - water - metal & hence
 his large emissivity.

Rough experiments by Pecklet-lead

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me to a figure for ϵ between
 water & metal as .013 to .027

The Mathematics of the following problem
 is too much for me. A ball of water
 of infinite depth. Saturated
 steam on its surface
 changes in temperature



$\theta = A \sin pt$
 where t is time

water at inf. distance from steam surface
 is at the average temp^{re} of the steam
 I am led to an equation

$$-KAa\epsilon \left\{ \sin(pt + aX) + c_1(pt + aX) \right\}$$

$$= \frac{dX}{dt} \text{ which I cannot solve}$$

where $l = \text{calent heat } 607 - .7\theta$ or
 $= 607 - .7A \sin pt$

If you cd. see your way to this problem
 in ten minutes, it wd. be worth your while
 - but not if it took longer time. I
 have a nice enough answer to

The general result of the work on
Escaping steam is this ~~that~~ the

If temp. falls from θ_1 to θ_2

& we have at first W_1 mass of water

& w mass of steam. Take $\theta_2 = 45^\circ\text{C}$

$$W_2 = .9311 W_1 + .045 w, \text{ if } \theta_1 = 85^\circ\text{C}$$

$$W_2 = .8973 W_1 + .0506 w, \text{ if } \theta_1 = 105^\circ\text{C}$$

$$W_2 = .8632 W_1 + .0537 w, \text{ " " } = 125^\circ\text{C}$$

$$W_2 = .8307 W_1 + .0551 w, \text{ " " } = 145^\circ\text{C}$$

Whereas if the expansion had been adiabatic

$$W_2 = .9354 W_1 + .0901 w, \text{ if } \theta_1 = 85^\circ\text{C}$$

$$= .9040 W_1 + .1033 w, \text{ " " } = 105$$

$$= .8760 W_1 + .1544 w, \text{ " " } = 125$$

$$= .8489 W_1 + .1803 w, \text{ " " } = 145^\circ\text{C}$$

Somewhat similar results when θ_2
has other values

Awfully ashamed I am to bore
you with these subsidiary matters
My wife wants to be remembered

Yours W
Henry