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COMMENT

'Electrostatic capacity of two unequal adhering spheres'

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Abstract. Earlier references to the capacity of two unequal tangent spheres are given.

In a recent paper, Moussiaux and Ronveaux (1979) have expressed the electrostatic capacity of two unequal tangent spheres in the form

$$C(R_1, R_2) = \frac{R_1 R_2}{R_1 + R_2}\left[2\psi(1) - \psi\left(\frac{R_1}{R_1+R_2}\right) - \psi\left(\frac{R_2}{R_1+R_2}\right)\right], \tag{1}$$

where R_1 and R_2 are the radii of the spheres, and $\psi(z) = \Gamma'(z)/\Gamma(z)$. However, this result is already in the literature (Russell 1925, Szegö 1945, and Pólya and Szegö 1951, for example). Similarly, expressions for the charges Q_1 and Q_2 on two tangent spheres at unit potential are found in the literature (Maxwell 1881 and 1892, Mathieu 1886 and Kottler 1927). We have

$$\begin{aligned} Q_1 &= \frac{R_1 R_2}{R_1 + R_2}\left[\psi(1) - \psi\left(\frac{R_2}{R_1+R_2}\right)\right], \\ Q_2 &= \frac{R_1 R_2}{R_1 + R_2}\left[\psi(1) - \psi\left(\frac{R_1}{R_1+R_2}\right)\right], \end{aligned} \tag{2}$$

with $C(R_1, R_2) = Q_1 + Q_2$. These expressions for Q_1 and Q_2 in terms of $\psi(z)$ are not given in the first edition of Maxwell's treatise (1873).

The quantities Q_1 and Q_2 were also obtained earlier by Poisson (1811) in the form of definite integrals.

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