

## Geometrical significance of the Laplacian

From: James Clerk Maxwell, *A Treatise on Electricity and Magnetism* (Clarendon Press, Oxford, UK, 1881) second edition, volume I, page 29.

If, with any point  $P$  as centre, we draw a small sphere whose radius is  $r$ , then if  $q_0$  is the value of  $q$  at the centre, and  $\bar{q}$  the mean value of  $q$  for all points within the sphere

$$q_0 - \bar{q} = \frac{1}{10}r^2\nabla^2q;$$

so that the value at the centre exceeds or falls short of the mean value according as  $\nabla^2q$  is positive or negative.

I propose therefore to call  $\nabla^2q$  the *concentration* of  $q$  at the point  $P$ , because it indicates the excess of the value of  $q$  at that point over its mean value in the neighbourhood of the point.