

neither the new theory nor any other holds completely. The surface of rupture is then no longer a plane, and the earth pressure is still an unsolved problem. In all practical cases the difference is but slight, and our theory commends itself as the one involving the fewest assumptions. So much, at least, we know, that the earth pressure must be zero when the backward angle of earth with wall  $\alpha = -(90 - \varphi)$ , because then the earth has the natural slope, and would stand, even without a wall.

To recapitulate, then :

For wall vertical or slanted forward we may use the results of I, II or III with confidence.

For wall slanted back, we must proceed still according as experience or custom may suggest or sanction.

The results hitherto given by older methods may be found from the new, by putting  $\delta = \varphi$  or  $\delta = 0$ .

Such is, in brief, the new theory of the retaining wall to which we wish to direct attention. We have, of course, spoken from a purely mathematical standpoint. We by no means leave out of sight the fact that there are destructive agencies, such as water, frost and decay, which can never be drilled into any formula, and which can never be safely disregarded by any engineer. We do not forget that the earth mass is not always homogeneous, and that the "angle of repose" is a very variable quantity. We might go on to enumerate other disturbing conditions which no mathematics can grapple with, but it is scarcely necessary. The intelligent engineer, who understands how his formulæ are obtained, understands equally what they do not and cannot cover as well as what they do, and recognizes those conditions which experience only can meet. The only questions which arise are, whether he is better off with experience alone, or with experience *plus* theory? If the latter, should not the theory be as free from unnecessary assumptions as possible?

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**Suspension and Elevation of Clouds.**—M. Oltramare supposes that the altitude of clouds is determined by the force of electrical repulsion between the clouds and the stratum of air below them. If the electricity is uniformly distributed, in accordance with any simple function of the height, the hollow sphere of air above the cloud can exert no influence.—*Comptes Rendus*. C.