Author's reply to Maini

In the case of a transversely isotropic medium whose axis of elastic symmetry is vertical, the shear modulus in the vertical plane G_{VH} is one of the five *independent* elastic constants necessary to define the stress-strain relationships for the material. It follows that analytical solutions in which G_{VH} is expressed in terms of other elastic constants must be classed as approximate. The solution given by Wolf (1935) is one of several that fall into this category.

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The misuse of SPT N value correlations with Upper Chalk grades

LORD, E. R. F. and SMITH, W. E. (1976). *Géotechnique* **26**, No. 1, 217-220.

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I would agree with Lord and Smith that there is no substitute for chalk grading by visual inspection. The deficiencies of using the SPT test to infer chalk grade are clearly made in my previous Technical Note and confirmed by my Fig. 1 (Dennehy, 1975). Overall changes in the N value with grade are small because the grades are usually of the same lithology. The N values obtained within a lithology are influenced by chalk grade because of the relative number of discontinuities and the nature of their infill, but there is no pronounced distinction in N values between grades. Thus the lack of a defined change in N value with chalk grade shown by Lord and Smith in their Figs 1 and 2 is only to be expected.

A principal point of the correlation I presented was to show that the relative hardness of the chalk is dependent on lithology and the correlations from lithologies cannot be interchanged. This is illustrated by my Fig. 2 which compares visually observed Upper Chalk grades with Wakeling's (1969) proposed correlation for Middle Chalk, and shows that they do not agree. Lord and Smith misinterpret this figure to mean that the SPT under-estimates the quality of the chalk.

Carter and Mallard (1974) have shown that there is a general trend for an increase in dry density with increasing age. It therefore follows that, in general, SPT N values in chalks of the same grade will be lower in younger chalks. It is also to be noted that in the grading system proposed by Ward *et al.* (1968) the only difference between grades I and II chalk is in their relative hardness. Grade I is taken to relate specifically to the harder marker bands found within the chalk such as the Chalk Rock. These facts indicate that each fossil zone will have a different density, and consequently a different range of N values would be expected in each. Some recent work by Clayton (1976) has shown this effect.

Although their sample is small, and some of their results are from below the water table, Lord and Smith indirectly confirm this dependence on fossil zone in their Table 3 which shows that N values are less in the *Micraster Coranguinum* than in the Middle Chalk. These values correspond reasonably with the values quoted by Dennehy in Table 2, given that the latter table also includes younger chalk zones.

It is interesting to see that Lord and Smith (Tables 3 and 4) report that chalk of the same zone and in the same cutting have significantly different N values. Experience would indicate that such rapid changes in N value could not occur unless either a change in zone occurred or there was a marked difference in discontinuity openings. Perhaps some qualification of the chalk grading is therefore required in this instance.

Certainly one cannot use N values in isolation, but there are circumstances, both physical and economic, in which visual inspection is restricted. In these circumstances, the fact remains that N values are used, and although they can be difficult to interpret and can be misused, this is not to say that they are of no use. Of course only if some visual inspection of the chalk on a site has been made can valid interpretations of N values be made. The correlation presented by Dennehy is therefore important in that it shows that low N values do not necessarily mean poor grade chalk.

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Design manufacture and performance of a lateral strain device

EL-RUWAYIH, A. A. (1976). *Géotechnique* 26, No. 1, 215–216.

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I congratulate the Author and his colleagues on developing a device for measuring automatically lateral deformation in the triaxial test. The accurate measurement of lateral strain in uniaxial and triaxial test specimens of soil or rock enables Poisson's ratio to be estimated and is of crucial importance in the calculation of the vertical principal stress difference. A direct measurement of the change in diameter of the deforming middle portion of a test specimen obviates the necessity for applying an area correction based on assumptions about the specimen's change in volume or change in shape, or both.

A lateral strain caliper for automatically measuring the change in diameter of uniaxial and triaxial test specimens has been developed at the University of Surrey and is shown in Fig. 1. It consists of a circular caliper cut from clear acrylic polymer plate. The hinge of the caliper is secured by a stainless steel pin bushed in PTFE. Diametrically opposite the hinge the caliper opening is bridged by a miniature water-submersible displacement transducer of the inductance type. The body of the transducer is partly housed in a block pivoting in the horizontal plane of the caliper on a PTFE-capped hollow stainless steel post fixed on one arm of the caliper. The armature of the transducer is similarly secured on the other arm of the caliper. Both the transducer body and transducer armature are thus free to maintain co-axial alignment of the coupled transducer during opening and closing the caliper. The caliper is