CORRESPONDENCE

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Mention is made in *Géotechnique* Dec. 1970 (Lyndon and Schofield) of the use of a centrifuge to increase weight and so cause shear failure in a model of a clay bank, thus assisting in the study of the failure of a full scale bank or dam.

The invocation of this principle—increase of weight by centrifugal acceleration—reminds me of a 'study' and an 'experiment' made over 30 years ago (in 1937 I think) at the Building Research Station, England.

Following the failure during construction of an earth dam at Chingford (Cooling and Golder, 1942), the working team A. W. Skempton, A. B. Lloyd and myself, under the capable and amiable captaincy of L. F. Cooling, discussed the possibility of demonstrating on models, by using a centrifuge, that failure would occur through the weaker portions of a dam section, on a surface which could be represented by two or more cylindrical surfaces.

We had a small centrifuge used for measuring centrifuge moisture equivalent, which test seems to have died out of use as an index property. However, this piece of apparatus was much too small. Lloyd and I decided that if we could demonstrate that the principle was sound we might be given money to develop the idea further.

After much discussion we decided that the simplest demonstration would be to cause the failure of a cylindrical sample by centrifugal acceleration, i.e. an unconfined compression test in which failure was caused by increasing the weight of the sample.

The 'yellow clay', on which the Chingford Dam was built (and failed) had a shear strength of 250–300 lb/sq. ft. We made a remoulded cylinder of this clay 3 in. in diameter and 15 in. long. This we placed in a cylindrical sample tin 5 in. in diameter and 15 in. long. At a distance of 1 in. from each end there was an annular cardboard packer of 3 in. internal diameter and $4\frac{7}{8}$ in. external diameter. Thus, if the tin were kept vertical the sample could not move laterally inside it but it could fail in axial compression.

The lid of the tin was then taped on and the tin was placed in a net which had once held tennis balls. The net was tied to a rope. Lloyd and I then went to the lawn beside the old house in which the 'admin' people were accommodated. The idea was that I should revolve on a vertical axis swinging the tin on the rope fast enough to keep it clear of the ground and gradually paying out rope to increase the radius and so the centrifugal acceleration until we had reached a value great enough to cause failure. Originally Lloyd was supposed to be a sort of 'scrum-half' who would run beside the tin and catch it at the end. However, a few preliminary calculations showed that he could not run fast enough so his role was changed to timekeeper. He timed the revolutions and kept a record of radius by observing coloured markers on the rope.

The experiment went well. I spun manfully and let out the rope until the lawn came up and hit me a crack on the side of the head. After the world stopped spinning I found myself lying flat on my back on the lawn looking up at the windows of the old house which were crowded by the faces of the typing pool who were convinced that that bunch from Cooling's section were drunk again. Lloyd was sitting on the lawn crowing gleefully over a perfect (well, almost perfect!) inclined shear failure in our cylindrical sample.

I have no records at this date, only memories. My recollection is that one revolution took between 2 and $2\frac{1}{2}$ seconds, and the length of the rope was 15–20 ft. I held the rope between waist and chest height (say 3 ft 6 in.) and the tin cleared the ground by about 6 in.

The acceleration calculated in terms of radius, a, and revolutions per second is shown in Fig. 1 in terms of g. This shows that for the values culled from my memory the acceleration was 4–5 times g.

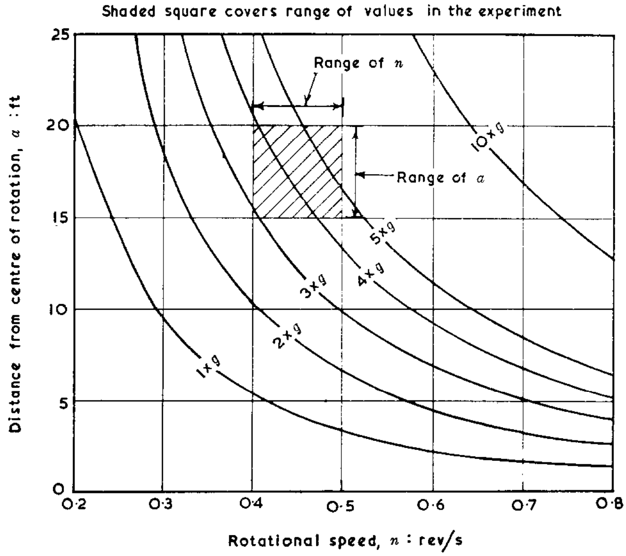

Fig. 1

The weight of the soil was 95 lb/cu. ft, and q_u was between 500 and 600 lb/sq. ft. Assuming a failure plane at 45° to the axis and which starts at the bottom of the sample, the average vertical pressure on the plane due to the weight of the sample above it is 107 lb/sq. ft. An axial stress of 500–600 lb/sq. ft is required to cause a failure in compression so that the weight must be increased between 4·7 and 5·6 times. Thus the acceleration required to cause failure is 4·7 to 5·6 times *g*.

This is an interesting example of what has been called 'the thirty year cycle'. Today many things are being invented which were first thought of thirty years ago in the early days of our subject, but were not developed to the point where they could be published. Where could they have been published? *Géotechnique* did not exist.

REFERENCES

Cooling, L. F. & Golder, H. Q. (1942). The analysis of the failure of an earth dam during construction. *Jnl Instn Civ. Engrs* **19** (Dec.) 38–55.

Lyndon, A. & Schofield, A. N. (1970). Centrifugal model test of a short term failure in London clay. *Géotechnique* **20**, No. 4, 440.

BOOK REVIEW

Ancient sedimentary environments. R. C. Selley. 237 pp. Chapman and Hall, London, 1970. £2·25.

The aim of this book is to indicate that distinctive types of sedimentary rock, arranged in definite patterns, occur in a given sedimentary environment. This concept of the orderly nature and distribution of sediments is of importance in the understanding and utilization of sedimentary rocks, not only in oil and gas exploration but also in ground water and site investigation, and general civil engineering. The book is divided into carefully chosen chapters in which a specific sedimentary environment, for example the deposits of rivers, is discussed. Each chapter is followed by a useful list of references. The book contains many clear diagrams, maps and photographs which ably support the well-documented text.

F.T.H.