## Contents

1. Modelling slope stability: the complimentary nature of geotechnical and geomorphological approaches  
   M. G. Anderson and K. S. Richards  
   1

2. A comparative review of limit equilibrium methods of stability analysis  
   D. F. T. Nash  
   11

3. Instrumentation of pore pressure and soil water suction  
   M. G. Anderson and P. E. Knudle  
   77

4. Slope stability analysis incorporating the effect of soil suction  
   D. G. Fredlund  
   113

5. The implications of joints and structures for slope stability  
   S. R. Hencher  
   145

6. Vegetation and slope stability  
   D. R. Greenway  
   187

7. Modelling the effectiveness of a soil-cement protective cover for slopes  
   M. G. Anderson and J. M. Shen  
   231

8. Groundwater models for mountain slopes  
   K. Okumishi and T. Okimura  
   265

9. Earthquake-prone environments  
   V. Cotecchia  
   287

10. Basal erosion and mass movement  
    K. S. Richards and N. R. Lorrman  
    331

11. General models of long-term slope evolution through mass movement  
    M. J. Kirkby  
    359

12. Modelling interrelationships between climate, hydrology and hydrogeology and the development of slopes  
    R. A. Freeze  
    381

13. Weathering effects: slopes in mudrocks and over-consolidated clays  
    R. K. Taylor and J. C. Cripps  
    405
<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>Author(s)</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>Quick clays</td>
<td>J. K. Torrance</td>
<td>447</td>
</tr>
<tr>
<td>15</td>
<td>Rock slopes</td>
<td>M. J. Selby</td>
<td>475</td>
</tr>
<tr>
<td>16</td>
<td>Mass movement in semi-arid environments and the morphology of alluvial fans</td>
<td>R. Le B. Hooke</td>
<td>505</td>
</tr>
<tr>
<td>17</td>
<td>Mechanisms of mass movement in periglacial environments</td>
<td>C. Harris</td>
<td>531</td>
</tr>
<tr>
<td>18</td>
<td>Dating of ancient, deep-seated landslides in temperate regions</td>
<td>R. H. Johnson</td>
<td>561</td>
</tr>
<tr>
<td>19</td>
<td>Slope development through the threshold slope concept</td>
<td>S. C. Francis</td>
<td>601</td>
</tr>
<tr>
<td></td>
<td>Author Index</td>
<td></td>
<td>625</td>
</tr>
<tr>
<td></td>
<td>Subject Index</td>
<td></td>
<td>637</td>
</tr>
</tbody>
</table>
SLOPE DEVELOPMENT THROUGH THE THRESHOLD SLOPE CONCEPT

(Graton and Fraser, 1935). As the cross-sectional area of pore necks is the main control over water movement (ignoring wetted surface area, capillarity, tortuosity, etc.) and provided that a soil is relatively free of fine-grained particles, then void ratio can be used as a soil-specific indicator of soil hydraulic conductivity when considering changes in particle size distribution with weathering (Fraser, 1935; Beard and Weyl, 1973; Statham, 1974).

If it is not assumed that soil particle characteristics are independent of size then particle shape, roundness, and mineralogy (especially with finer soils) also have to be considered as these parameters are size dependent, varying considerably with the state of weathering (Francis, 1984) and affecting the void ratio and hence hydraulic conductivity (Fraser, 1935; Gaither, 1953; Rogers and Head, 1961; Beard and Weyl, 1973). A further important control over soil hydraulic conductivity is the soil organic material, which promotes soil structure with the development of a secondary soil hydraulic conductivity, and differentiation into soil horizons of different hydrological properties.

19.4 SUMMARY

This chapter has not attempted to provide answers to the problem of assessing the influence of mass movement upon slope evolution. Instead it has highlighted a series of unresolved problems which are relevant to stability modelling. It is evident that the state of the art is insufficiently precise to allow sweeping evolutionary statements to be made (Anderson et al., 1980). In the short term, site-specific studies indicate that mass movement can control the form of steep slopes, but inevitably evolutionary interpretations become more speculative over longer time-scales. This is a particular problem as most studies of slope development have been made in temperate regions where palaeoclimates have been variable: perhaps this variability can be minimized by looking in more detail at slopes which have evolved under more constant environmental conditions.

REFERENCES


SLOPE STABILITY


