dynamic and partly hydrostatic forces, stress concentration in the zone of the slope or escarpment, loading, seismic or other external influences. A relative increase of shearing forces may be due to a decrease in rock strength induced by the change in physical state with moistening, swelling, loosening, weathering, disturbing the natural structure, changing the stress state or other factors.

This conclusion concerning the causes of the gravitation phenomena is important as it indicates, firstly, the regularity of gravitational process development and, secondly, the possible choice of preventative or protective engineering measures.

Each type of gravitational phenomenon is characterized by a particular mechanism of displacement and movement of the rock mass. The paper deals with mechanisms of gravitational processes and the types of gravitational phenomena corresponding to them. The velocity of the moving rock mass determines the dynamics of the process but not its mechanism.

The dynamics of gravitational process development include three stages: the preliminary stage, generally characterized by the gradual decrease of rock mass stability; the actual generation of the phenomenon, generally characterized by quick or sharp loss of rock mass stability; and the stage of stabilization or restoration of rock mass stability. The analysis described enables a prognosis of the development of the gravitational process and an estimate of the degree of its threat.

ON THE POSSIBILITY OF USING MICROWAVE ENERGY FOR SOIL STABILIZATION

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The development of microwave energy investigations in the last few decades gives the opportunity to offer a new method of stabilization of different types of soil by heating. The physical basis of these processes is the intensive absorption of microwaves by different materials, which results in their heating. In 1971 the Department of Soil Engineering and Engineering Geology of Moscow State University suggested a new thermal method of soil stabilization utilising microwave energy.

The prime task when the microwave energy method was under consideration was to define the absorption ability of several soils. The measurements were done with a wave length of 3–10 cm for samples of hydromica and montmorillonite clays, and polymineral loess-like loam.

The measurements were conducted at room temperature with the help of a measuring line at the low power level, and with the temperature of the samples remaining constant. The results showed that the characteristic wave length of absorption for all the soils is very close to the wave length of the radiation and that the absorption indicator is very high, about 0.1-0.2. So it was concluded that the soils under consideration absorb the microwave energy intensively and hence one can expect intensive heating in the field of microwave radiation.

A study of firing of clay and loess samples using microwave energy was done using a rectangular standard section 34 x 72 mm. The power of the microwave energy radiation was graduated by steps of 200–300 W, and the samples were kept for a period of five minutes at each power interval. In the course of the experiment it was found that idependent of the composition of the samples the increase in power to more than 1.5 kW resulted in quick heating of the samples up to bright illumination. After 25 minutes of this, the samples of clay and loess melted and turned into glass. The high temperature firing of clays to form ceramics took place with the power at 600–800 W, about 200 kW/m^2.

The possibility of effective soil heating using microwave radiation was investigated in natural soils of different lithological composition.

When the soil is radiated by microwave energy (wave length 1–30 cm) the absorption of microwave radiation takes place to a depth equal to the radiation wave length. This results in heating of the whole volume of the radiated sample. So one can raise the temperature of the soil up to 2000° C in a period of 20–25 minutes with the help of relatively low power microwave radiation.

The low heat conductivity of the soils which is a negative factor for their stabilization using previously known methods, is a positive factor when the microwave evergy method is applied. It lowers convectional losses of heat through the surface and enables the use of 100 % of the microwave energy for heating the soil.

Depending on the microwave power level one can accomplish different technological operations including drying, low temperature firing, sintering, and vitrification.

The microwave method of soil stabilization is easy from a technological point of view, because it is a non-contact method. The soils can be treated with the microwave energy generator at a considerable distance from the object radiated. Energy losses are estimated at 1400 kW hour/m^3.

The applications of the microwave energy method of soil stabilization in the national economy could be wide ranging.

Significant results can be obtained when the method is applied to prevent slope processes. The method gives the opportunity to stabilize soil in situ when the microwave energy generator is at a considerable distance, and may be applied in the stabilization of unconsolidated slope deposits in areas subject to landslides and earth flows, and especially in areas where the relief prevents the application of other methods.

The method can be widely applied to stabilize slopes and assist the excavation of cuts, pits and channels and also to stabilize tunnel walls and underground openings. We can expect good results when the microwave energy method is applied in road and airfield construction for pavements and foundations; the method is especially significant for the stabilization of weak soils.

Furthermore the method is non-toxic and its application will not pollute the environment.

ENGINEERING GEOLOGY AND SUBDIVISIONS IN SOUTH AUSTRALIA

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All subdivisions in South Australia are approved by the State Planning Office on the basis of planning requirements and recommendations from other relevant government departments, including the Department of Mines, as to the suitability of the land for development. Advice from the Department of Mines includes comments on whether the subdivision will prevent or inhibit the extraction of construction materials or economic minerals, and, if so, it is opposed. In addition most sites are subjected to a detailed engineering geological inspection.

In the hilly areas it is unusual for a proposal to be rejected on grounds of slope stability due to a planning regulation which prevents development on slopes steeper than 1 on 4. This eliminates much land which is basically unsuitable for residential development in a State subject to earthquake activity. However, modifications are often necessary to proposals which impede natural drainage or in which efficient septic tank effluent disposal is unlikely. Extensive cuts for access roads and house pads are discouraged on the grounds of stability. Abandoned quarries within or adjacent to the sub-