

## **Experimental study of creep properties of undisturbed shear zone soil of the Huangtupo landslide**

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The Huangtupo landslide is the largest reservoir landslide in the Three Gorges Reservoir area and consequently attracts a great deal of attention. The stability and long-term deformation of the landslide are greatly controlled by shear zone, of which time-dependent creep behaviour would accelerate strength reduction and soil deformation, resulting slope failure. The creep properties of the undisturbed shear zone were studied via triaxial creep testing. Two creep stages (primary stage and attenuation secondary creep stage) were observed, characterized by creep rate approached zero, with an instantaneous deformation and a constant speed developing, which indicates that the deformation became stable with time. It can be found that creep behaviour of undisturbed shear zone under three-dimensional stress has a significant difference from that of direct creep test on reconstituted shear zone in two-dimensional stress, due to the influence of confining pressure and coarse particles. Both the initial strain and the ultimate strain increased as the confining pressure increased, and there was a corresponding correlation between the creep rate and deviatoric stress. By adopting CT scanning technique, rotation of some coarse particles at middle part of samples were obvious reflected by their shapes, and particle position adjustment were more apparent at bottom. On this basis, an empirical constitutive model was put forward to describe the relationships between stress, strain and time, and this model fits the experimental data well.