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论文

地震作用下土体变形破坏模式与机理

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摘要:

为探讨土体的地震变形效应,对都江堰—映秀公路全线挂网喷混凝土防护削方边坡和人工填筑路堤震害进行了调查分析,发现挂网喷混凝土防护边坡和路堤等具有侧向临空面的土体,其地震变形破坏表现为震陷和滑塌,而路肩墙工程由于墙体的侧向约束,填料的地震变形表现为震陷变形和下陷与隆起交错变形(即凹凸变形). 震陷率和凹凸变形幅值均随地震烈度增大而增大,且均服从正态分布. 上边坡震害受平面线型程度影响较大,位于直线段、凹曲线侧和凸曲线侧边坡的震害程度依次递增. 经路堤(侧向临空模型)和层状填料(侧向约束模型)振动台模型试验验证,试验结果与现场调查一致,且揭示了土体由震陷向凹凸变形转化的峰值加速度阈值约为0. 6g,可供评估路堤震害模式和确定修复措施参考.

关键词: 路基工程 变形破坏模式 震害调查 振动台模型试验 汶川地震

Seismic Deformation and Failure Modes and Mechanism of Soil Mass

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Abstract:

To study the seismic deformation effect of soil mass, a field investigation on slopes reinforced by shotcrete-bolt system and road embankments along Dujiangyan to Yingxiu highway was conducted. The investigation shows that the seismic deformation and failure modes of soil mass laterally unrestrained as slopes and road embankments are characterized by subsidences and lateral landslides, while soil mass laterally restrained by retaining wall is characterized by ubsidences and concavo- convex deformation, i. e. , alternative settling and bulging deformation. Seismic subsidence rate and concave-convex amplitude rise with the increase of seismic intensity and obey a normal distribution. Seismic damage level of the upper slope is affected by plane alignment of highway. The slope damage of a convex-curve section is more serious than a concave-curve section, and the damage of a linear section is most light. Shaking table tests of soil mass models laterally unrestrained or laterally bounded were conducted, and the results are consistent with the field investigation ones. The threshold of peak ground acceleration from subsidence to concave-convex deformation is approximate 0. 6 times of gravity acceleration.

Keywords: subgrade engineering deformation and failure mode field investigation shaking table model test Wenchuan earthquake

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