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On the Applicability of Reliability-Based Design for Debris Flow Protection Structures

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Debris flows are one of the most dangerous and destructive natural process due to their unpredictability, their extremely high motion and their magnitude. Mitigation measures are fundamental for reducing the associated risk and protecting infrastructures in mountainous areas.

However, their design is still an open issue: there are many formulations to evaluating impact pressure and the uncertainties in the determination of flow characteristics (velocity and thickness)

are significantly high and difficult to quantify. In the European Union, the design of any type of structures involved in rock mechanics field must comply with EN-1997 Geotechnical Design (CEN 2004) (EC7). For debris flow countermeasures, EC7 requirements are very difficult to apply in practice since partial safety factors are not provided for these phenomena. However, the basic philosophy of reliability-based design (RBD), as defined in EN1990 (CEN 2002) may be a suitable and complementary approach to provide geotechnical structures with a uniform probability of failure. Reliability Based Design (RBD) can provide additional insights to EC7 design and can be applied when partial factors have still to be proposed (by EC7) to cover uncertainties of less common parameters, as in case of debris flow countermeasures.

Biography:

Federico Vagnon obtained his master's degree in environmental engineering in 2013 at the Politecnico di Torino. In 2014 he won a grant for a Ph.D position at the Department of Earth Sciences of the University of Turin and in 2017 he obtained his Ph.D degree with a thesis entitled: "Theoretical and experimental study on the barrier optimization against debris flow risk". He is currently a research fellow at the same department. He is author of about 25 scientific paper on topics related to Geotechnics, Rock Mechanics, Engineering Geology and Geophysics.