Guest Editorial for the Special Issue on “Durability of Geosynthetics”

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The use of geosynthetics in civil engineering is not new, but ensuring their durability is still a concern in many applications. In some cases (e.g., in waste landfills), the premature failure of these materials can compromise the proper functioning of the structures where they are inserted, resulting in negative consequences for the environment and society. The long-term behaviour of geosynthetics, which usually has to be predicted, is a key aspect of their application and their ability to correctly perform their functions over time. The guarantee of durability is not an option but a demand in most applications of these materials. “How long will they last?” is the short but difficult question that has to be properly answered.

The special issue on “Durability of Geosynthetics” includes contributions focused on the behaviour of geosynthetics subjected to different degradation agents, namely creep [1], temperature [2], mechanical damage and abrasion [3], on-site installation procedures [4], and weathering [5, 6]. Many aspects related to the durability of geosynthetics are covered in the special issue, including laboratory [1–3, 5] and field [4, 6] testing, modelling [1, 3], and on-site practical experience [4]. This special issue features contributions both from researchers and practitioners, including not only some recent advances in knowledge about the durability of geosynthetics, but also some insight into the current state of practice. The Guest Editors hope that the articles selected for the special issue will be of use to readers of the *International Journal of Geosynthetics and Ground Engineering*.

The first article by Filho and Maia [1] explores a non-conventional creep test for geosynthetics using a saturation and drying procedure simultaneously to the creep process. The authors claim that non-conventional creep tests

(simultaneous exposure to creep and other degradation agents) allows for long-term behaviour studies that more closely match real-world application conditions. Conventional and non-conventional creep tests were performed and models were proposed to predict the creep behaviour of four woven geotextiles (two made from polyester and two made from polypropylene).

The second article by Bilgin and Shah [2] studies the effect of temperature on geomembrane and soil interface shear strength. The shear tests were carried out on a large direct shear device placed inside a temperature controlled walk-in chamber. High-density polyethylene geomembranes with different surfaces (smooth and textured) and thicknesses were tested. The soil used was Ottawa 20/30 sand. Due to the influence of temperature on the soil–geomembrane interface shear strength, the authors recommend that design engineers consider temperatures based on project location, construction conditions, and expected temperatures during service life.

The third article by Paula and Pinho-Lopes [3] presents simple constitutive models to represent the tensile response of a polypropylene geotextile and the influence of two degradation agents, namely mechanical damage and abrasion. The degradation agents were simulated in the laboratory and were considered acting independently and sequentially on the geotextile. The authors used two types of models: polynomial and hyperbolic. The ability of the models to represent the damage induced to the geotextile was examined and discussed.

The fourth article by Gilson [4] deals with advancements in field testing for locating geomembrane installation damage. The available electrical leak location methods were presented and advancements in dipole method equipment for faster and more precise testing were discussed. Recommendations were made for further optimizing testing effectiveness. The author states that covered geomembrane testing can be done with the certainty of locating all installation damage before the operational life of a containment facility.

The fifth article by Carneiro et al. [5] analyses the laboratory degradation of a reinforcement geocomposite (a

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polypropylene geotextile reinforced with polyethylene terephthalate filaments) under different accelerated weathering conditions. The effect of many parameters of artificial weathering tests was evaluated, namely: composition of the weathering cycle, temperature and irradiance of the UV exposure, UV radiant exposure, and total duration of the tests. The knowledge about how each parameter influences degradation can be useful for designing artificial weathering tests for geosynthetics.

The sixth article by Aparicio-Ardila et al. [6] evaluates the degradation of a nonwoven polypropylene geotextile exposed to natural weathering for 1 and 3 years in São Paulo, Brazil. The degradation suffered by the geotextile was assessed by monitoring changes in its physical properties (mass per unit area and thickness) and tensile behaviour. In addition, two analytical techniques were used: differential scanning calorimetry and scanning electron microscopy.

The special issue covers some aspects of the durability of geosynthetics, but there are many others for which no contributions have been received. Unfortunately, not many articles have been published in this area in recent years. Taking into account the crucial role that geosynthetics play in many structures, further studies should be carried out to obtain reliable predictions of their durability and promote a more sustainable application of these materials. Researchers, as well as manufacturers and practitioners, should all be involved and committed to achieving this common goal.

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