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Design and manufacturing of an aggregate abrasion test device for testing in high acceleration field

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Abstract

This paper describes the design and manufacturing of a mechanical system, the Aggregate Abrasion Test Device (AATD), which comprises of a rolling model drum, with the purpose of obtaining experimental data that is subsequently used to quantify the abrasion behaviour of aggregate particles. The study of the abrasion behaviour of geomaterials is complex due to among other factors, non-linear mechanical properties that depend on stress levels and stress history. In this case the aggregate assemblage is subjected to different stress levels by operating the system within the geotechnical centrifuge environment. The system was tested up to a maximum gravitational force of 25-G. The paper focuses on the design, manufacturing, construction, testing of the system and the experimental lessons or findings observed during the prototype testing. The system provides an alternative experimental way for determining the durability of the aggregate solely dominated by particle-to-particle interaction mechanism.