Data Article

A dataset on void ratio limits and their range for cohesionless soils

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A R T I C L E  I N F O

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A database, which consists of maximum and minimum void ratio limits and their range, particle size, distribution and shape characteristics, is compiled. More specifically, minimum and maximum void ratios ($e_{\text{min}}$ and $e_{\text{max}}$) along with their range ($e_{\text{max}}-e_{\text{min}}$), particle roundness ($R$) and sphericity ($S$), fines content ($FC$), coefficient of uniformity ($Cu$), mean grain size ($D_{50}$) data are compiled from natural cohesionless soils and reconstituted grained material (e.g.: rice, glass beads, mica) mixtures. The final dataset is composed of 636, mostly soil samples. Out of 636 samples, 496, 474 and 603 of them have $e_{\text{max}}$, $e_{\text{min}}$ or $e_{\text{max}}-e_{\text{min}}$ data, respectively. Similarly, for 593, 419, 171, 126 and 93 soils, $D_{50}$, $Cu$, $R$, $S$ and $FC$ data exists, respectively. Not for every sample, USCS based soil classification designation is available, hence for the missing ones, soil classification is performed based on mean particle diameter-based classification as suggested by ASTM D2487 – 17: Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System) [1]. The dataset consists of 19 silts and clays, 527 sands (357 fine sands, 153 medium sands, 17 coarse sands) and 47 gravels (44 fine gravels, 3 coarse gravels). A spreadsheet summary of the dataset is provided. This dataset is later used for the development of probability-based void ratio predictive models.

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1. Data

This paper provides details about database compilation efforts including but not limited to index properties and void ratio limits of different soil types (clay, silt, sand, gravel). The data consists of a summary spreadsheet, where original and cross-references, soil type, soil classification and index properties: roundness (R), sphericity (S), fines content (FC), mean grain size distribution (D50), coefficient of uniformity (C_u), minimum, maximum and range of void ratio (e_{max}, e_{min}, e_{max}-e_{min}) are presented. The final dataset is composed of 19 silts and clays, 527 sands (357 fine sands, 153 medium...
2. Experimental design, materials and methods

The compiled dataset presents a summary of the experimental findings including minimum and maximum void ratios ($e_{\text{max}}, e_{\text{min}}$) along with their range ($e_{\text{max}} - e_{\text{min}}$), grain size (represented by mean grain size $D_{50}$), grain distribution (represented by coefficient of uniformity $C_u$ and fines content, FC), and grain shape (represented by roundness $R$ and sphericity $S$) parameters for different types of mostly cohesionless soils. The final dataset is composed of 60.2% fine sand, 25.8% medium sand, 2.9% coarse sand, 7.4% fine gravel and 0.5% coarse gravel data. The dataset is filtered and analyzed by using the Microsoft Excel software. This data article provides documentation of data for the development of new void ratio predictive models.

A summary of the data is given in Supplementary A. The output table in each spreadsheet contains the following columns:

- Data number
- Soil Type (Monterey no.0/30 Sand, Cambria Sand, Ottawa Sand etc.)
- Soil Classification (Fine Gravel, Coarse Sand etc.)
- Roundness, R
- Sphericity, S
- Fines content, FC
- Mean grain size distribution, $D_{50}$ (mm)
- Coefficient of uniformity, $C_u$
- Maximum void ratio, $e_{\text{max}}$
- Minimum void ratio, $e_{\text{min}}$
- Void ratio range, $e_{\text{max}} - e_{\text{min}}$
- Test Method (ASTM, JGS etc.)
- Reference

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Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.dib.2019.104696.

References

[1] ASTM D2487-17, Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System), ASTM International, West Conshohocken, PA, 2017, https://doi.org/10.1520/D2487-17.