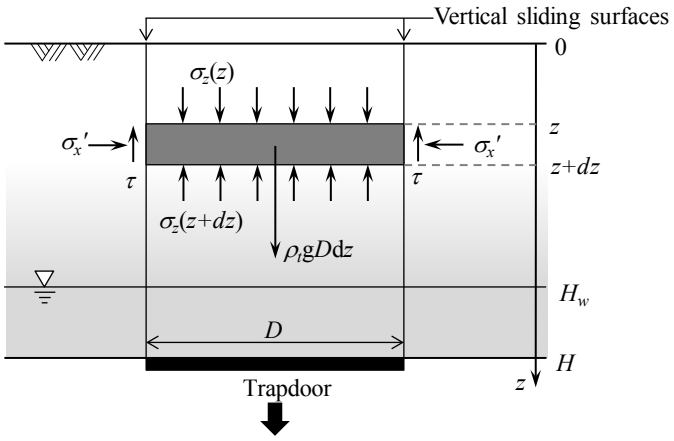


Fig. 1. Trapdoor problem in unsaturated soil.

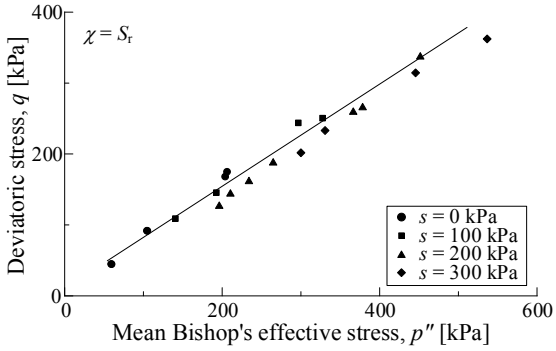


Fig. 2. Relation between mean stress, p'', and deviator stress, q, of Bishop's effective stress (replotted from Sivakumar[12]).

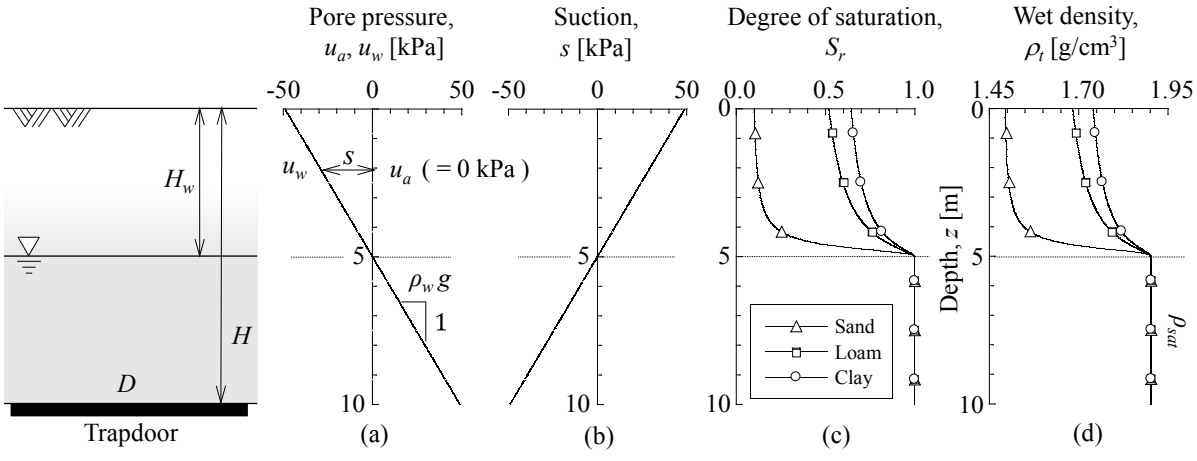


Fig. 3. Vertical distribution of (a) pore pressure, u_a, u_w; (b) suction, s; (c) degree of saturation, S_r; and (d) wet density, ρ_t (overburden height, H = 10 m, width of trapdoor, D = 10 m, and groundwater level, H_w = 5.0 m).

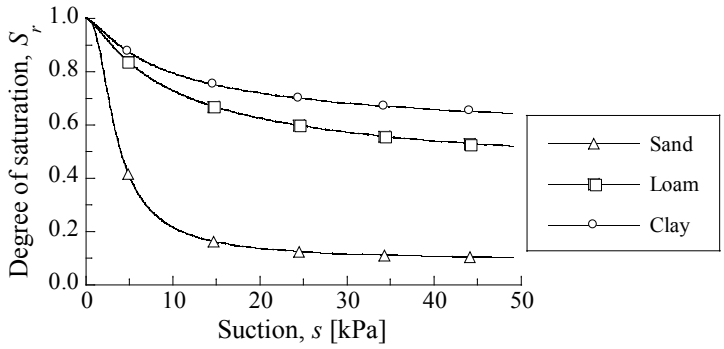


Fig. 4. Soil–water characteristic curves for sand, loam, and silty clay.

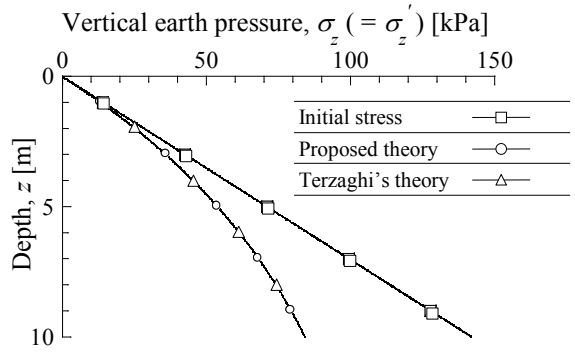


Fig. 5. Depth *vs*. loosening earth pressure in fully-dried ground.

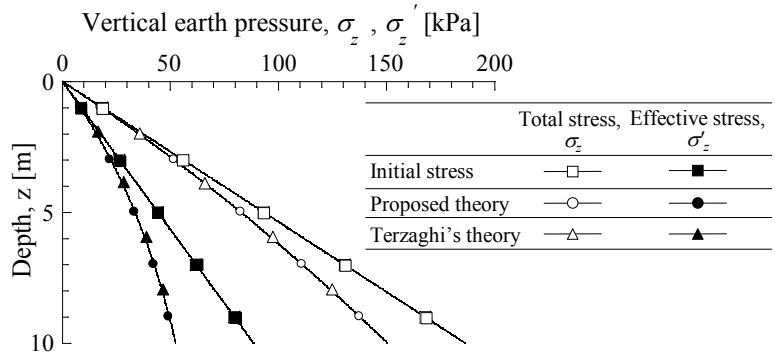


Fig. 6. Depth *vs*. total and effective loosening earth pressures in fully-saturated ground (groundwater level, H_w = 0.0 m).

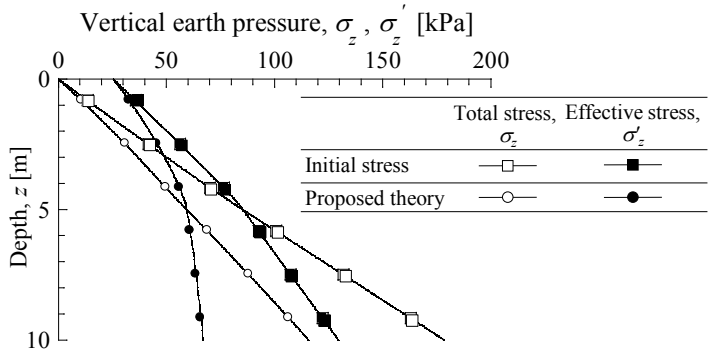


Fig. 7. Depth *vs*. total and effective loosening earth pressures in unsaturated ground (groundwater level, H_w = 5.0 m).

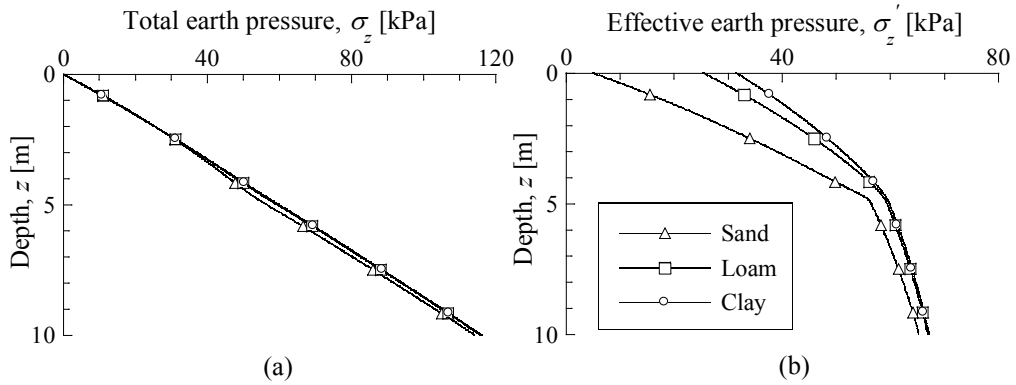


Fig. 8. Vertical distribution of (a) total loosening earth pressure and (b) effective loosening earth pressure in sand, loam, and silty clay (overburden height, H = 10 m, and groundwater level, H_w = 5.0 m).

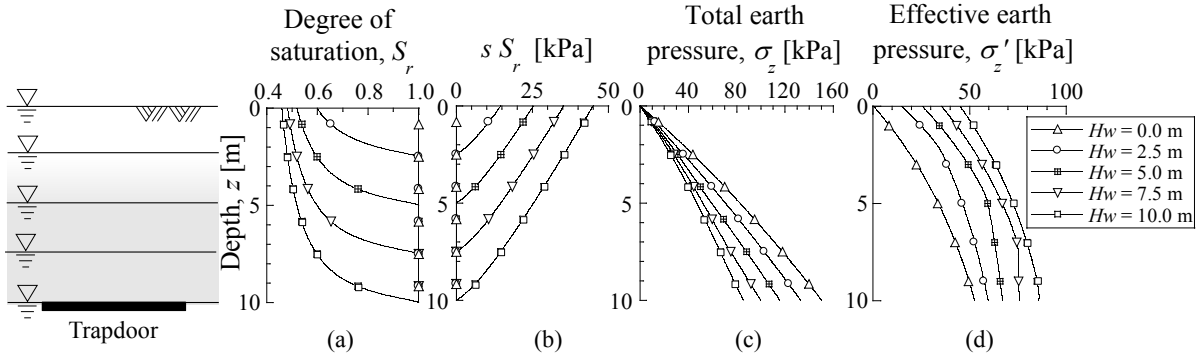


Fig. 9. Vertical distribution of (a) degree of saturation; (b) product of degree of saturation and suction; (c) total loosening earth pressure; and (d) effective loosening earth pressure in loamy ground (overburden height, H = 10 m, and groundwater level, H_w = 0.0, 2.5, 5.0, 7.5, 10.0 m).

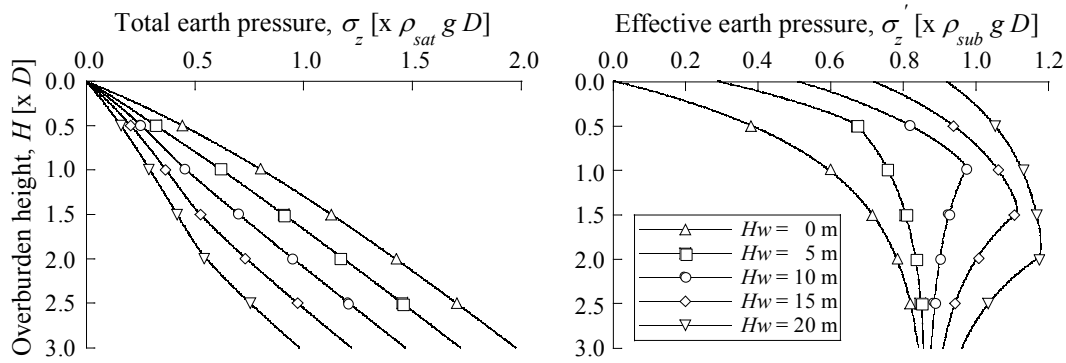


Fig. 10. Overburden height *vs*. (a) normalized total loosening earth pressure and (b) normalized effective loosening earth pressure in unsaturated ground at different groundwater levels (overburden height, H = 0.0–3.0D, width of trapdoor, D = 10 m, and groundwater level, H_w = 0, 5, 10, 15, 20 m).

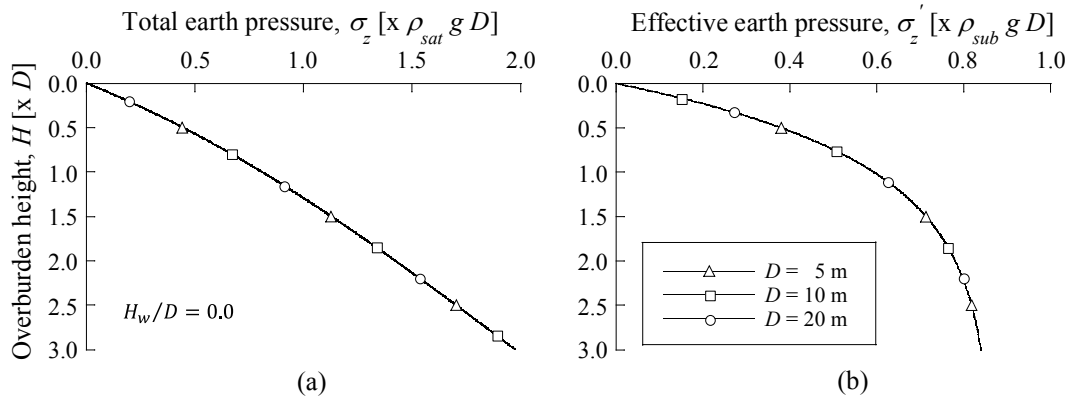


Fig. 11. Vertical distribution of (a) total loosening earth pressure; (b) effective loosening earth pressure in saturated, loamy ground (overburden ratio, H = 0.0–3.0D, and groundwater level, H_w = 0.0D).

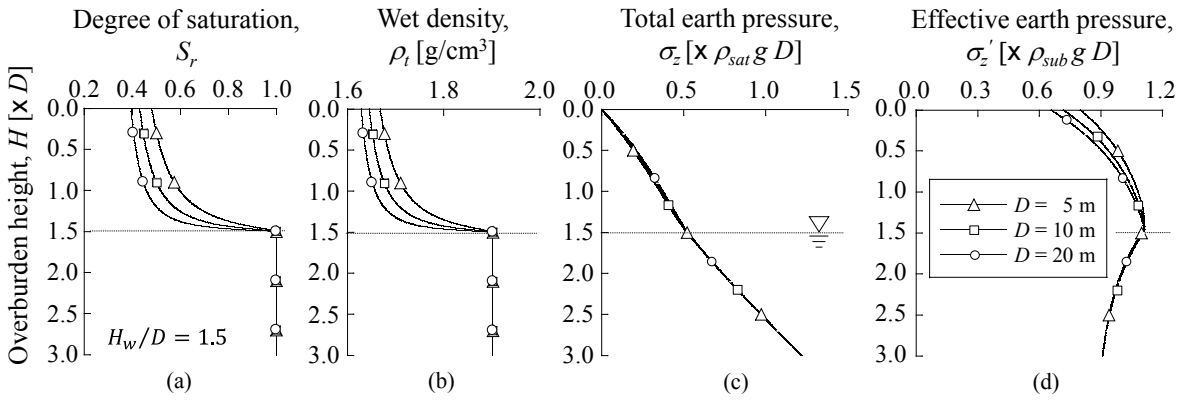


Fig. 12. Vertical distribution of (a) degree of saturation; (b) wet density; (c) normalized total loosening earth pressure; and (d) normalized effective loosening earth pressure in loamy ground (overburden, H = 0.0–3.0D, and the groundwater level ratio, H_w = 1.5D).

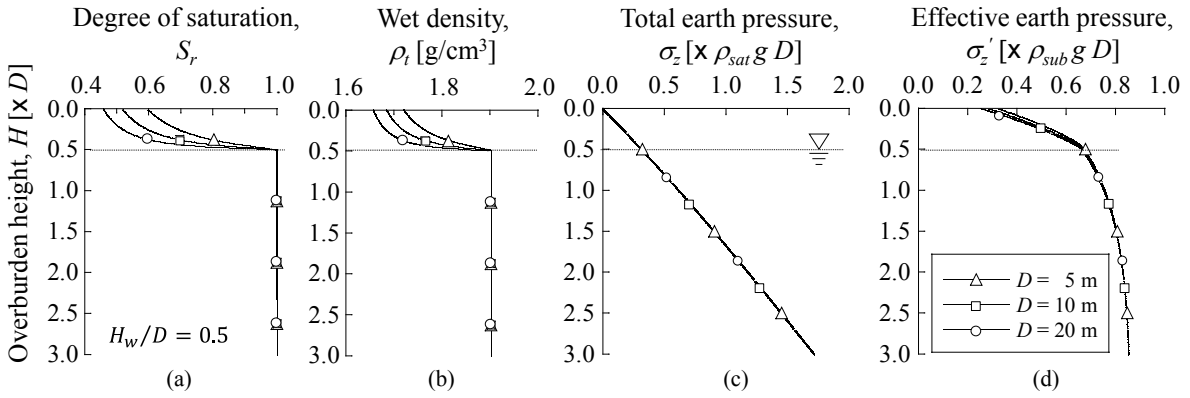


Fig. 13. Vertical distribution of (a) degree of saturation; (b) wet density; (c) normalized total loosening earth pressure; and (d) normalized effective loosening earth pressure in loamy ground (overburden ratio, H = 0.0–3.0D, and the groundwater level ratio, H_w = 0.5D).

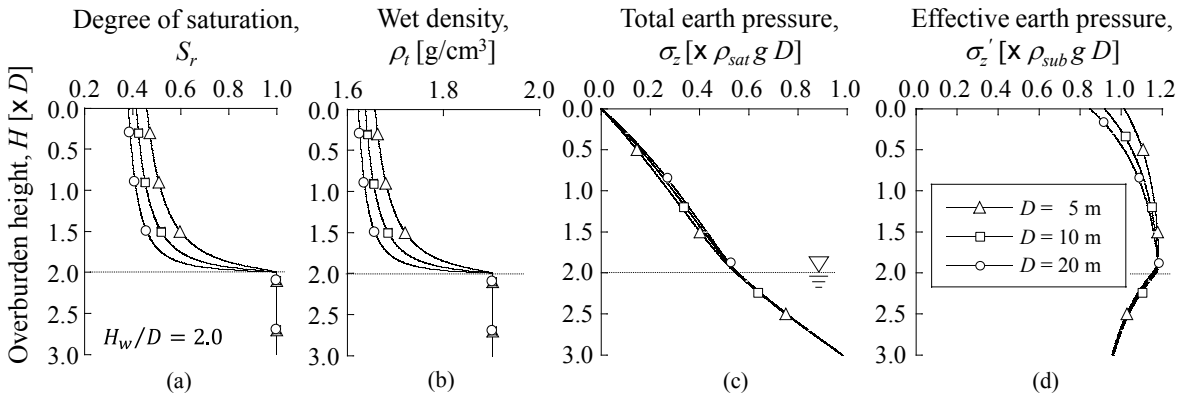
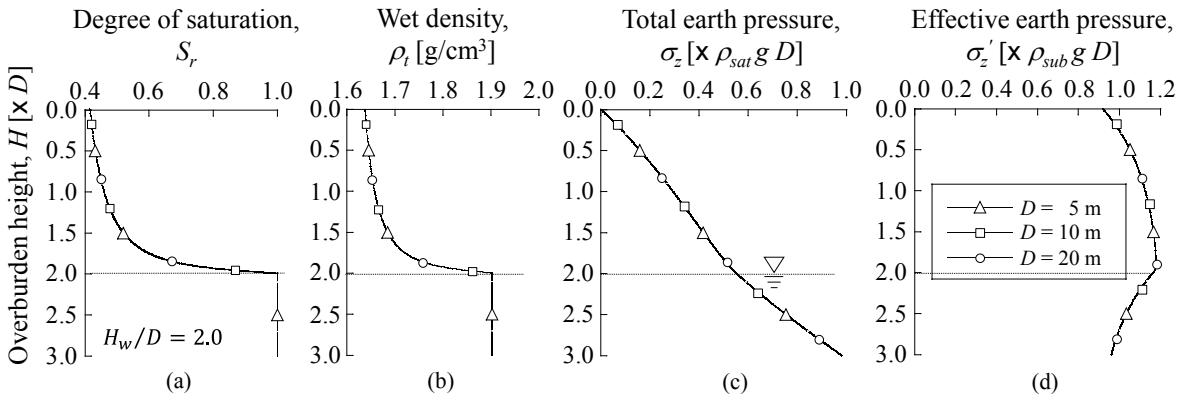


Fig. 14. Vertical distribution of (a) degree of saturation; (b) wet density; (c) normalized total loosening earth pressure; and (d) normalized effective loosening earth pressure in loamy ground (overburden ratio, H = 0.0–3.0D, and groundwater level ratio, H_w = 2.0D).



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56 Fig. 15. Vertical distribution of (a) normalized degree of saturation; (b) normalized sS_r; (c) normalized effective loosening
57 earth pressure; and (d) normalized total loosening earth pressure in loamy ground (overburden ratio, H = 0.0–3.0D, and
58 groundwater level ratio, H_w = 2.0D).

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