Lateral Loads on Piles - Randolf

u = lateral displacement at ground level,
z = depth below ground level,
H = lateral load applied at ground level,
M = bending moment in pile,
r_0 = radius of pile,
E'_p = effective Young's modulus of a solid circular pile of radius r_0, i.e. $4E_pI_p/\pi r^4_0$
G_c = characteristic modulus of soil, i.e. the average value of G^* over depths l_c
$G^* = G(1 + 3\nu/4)$,
G = shear modulus of soil,
ν = Poisson's ratio of soil,
l_c = critical length of pile

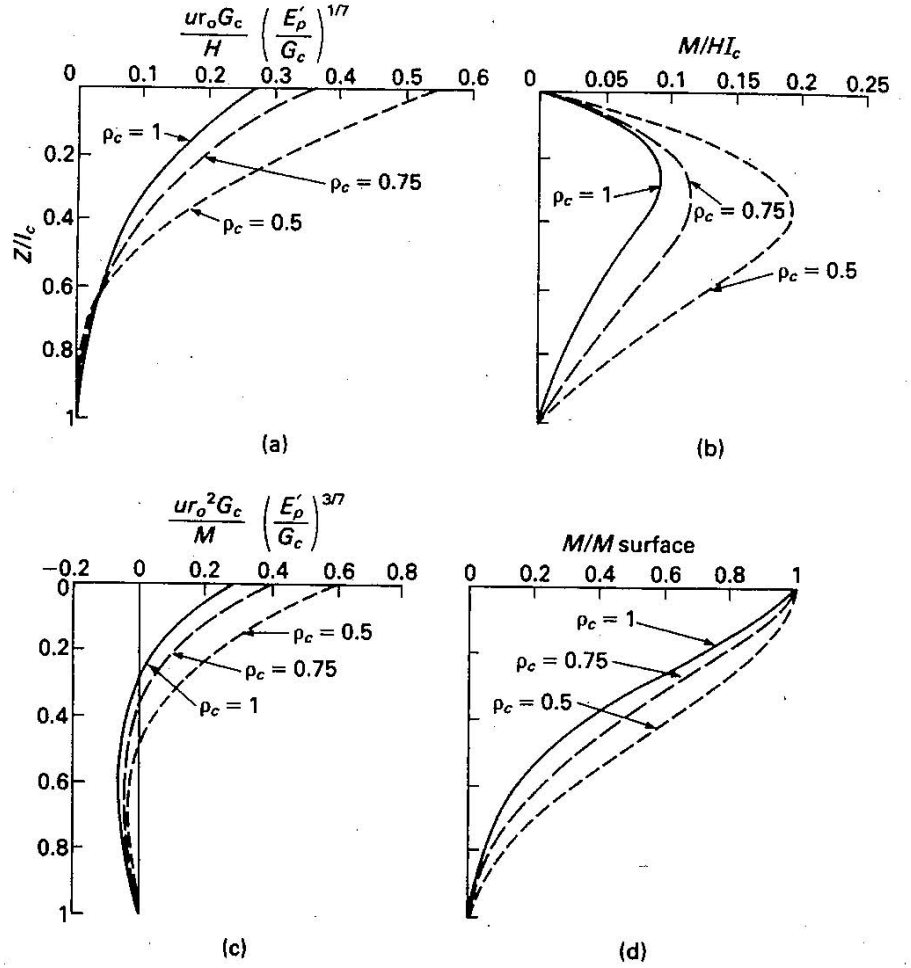
$= 2r_0(E'_p/G)^{2/7}$ for homogeneous soil

$= 2r_0(E'_p/m^*r_0)^{2/9}$ for soil with stiffness proportional to depth,

$m^* = m(1 + 3\nu/4)$,

$m = \frac{G}{z}$, where G varies with depth as $G = mz$,

ρ_c = homogeneity factor $= \frac{G^* \text{ at } l_c/4}{G^* \text{ at } l_c/2}$.



ted pile subjected to lateral force loading and bending moment (after Randolph[7.54]). (*a*) Deflected pile shap
) Bending moment profile for lateral force loading. (*c*) Deflected pile shape for moment loading. (*d*) Bendi
ent loading.