<div style="border:1px solid; background:#fdfde8; text-align:center;">

Problem 4-22

</div>

Use the RETC (van Genuchten et al., 1991) program to calculate the soil hydraulic properties of the van Genuchten hydraulic model (1980) for the following three sets of data (note that h is the same for each set). Plot the observed and predicted retention curves using $m = 1 - n^{-1}$. Discuss the differences between the results.

Table 4-5: Water contents as a function of pressure heads for 3 soils

-h (cm)	θ_1 (cm^3 cm^{-3})	θ_2 (cm^3 cm^{-3})	θ_3 (cm^3 cm^{-3})
0	0.46	0.430	0.380
45.58	0.45	0.311	0.373
96.9	0.42	0.245	0.366
150	0.38	0.212	0.360
204	0.34	0.191	0.355
266.7	0.3	0.176	0.351
346.4	0.26	0.163	0.346
458.3	0.22	0.151	0.341
635.9	0.18	0.139	0.334
979.8	0.14	0.126	0.325
1990	0.1	0.110	0.310
7998	0.07	0.093	0.282

The RETC program may be downloaded free of charge at http://www.pc-progress.cz/Pg_RetC.htm.

<u>Answer:</u>
Using the data given in the table, the soil hydraulic properties of the van Genuchten ($m = 1 - n^{-1}$) model for the three soils are given in the table below

Table 4-6: van Genuchten parameters for 3 soils

	Soil 1	Soil 2	Soil 3
θ_r (cm^3 cm^{-3})	0.06	0.078	0.061
θ_s (cm^3 cm^{-3})	0.46	0.43	0.38
α_{VG} (cm^{-1})	0.005	0.036	0.008
n (-)	2.0	1.56	1.09

The RETC program produced the three best-fit retention curves below (note that the pressure head in RETC program is absolute value).

Determine with, RETC, the soil hydraulic properties for the other seven models.
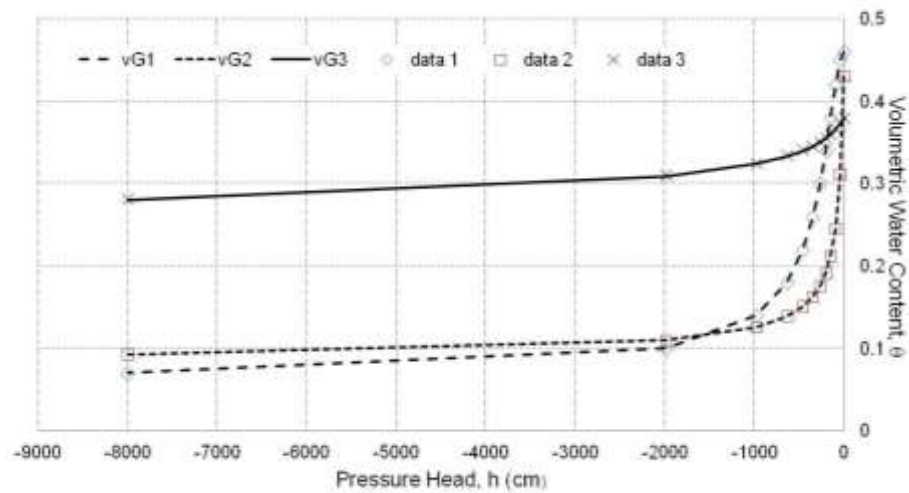

Fig. 4-18: Water retention data for the three soils with best-fit van Genuchten equation