FYS4630/FYS9630

Assignment #6 Friday October 23, 2015

1) A cloud begins to form in the sky overhead as the cloud thickens. The visual brightness of the cloud's bottom side will brighten, reach a maximum and then begin to decrease as the cloud becomes optically thicker. Ignore effects of gound reflection. (We consider solar radiation only.)

   a) Explain the behavior in physical terms.

   b) Use the two-stream program to find the cloud optical depth for which the diffuse downward flux at the ground reaches a maximum. Assume an asymmetry factor of 0.95, pure scattering, no surface reflection. You can model the atmosphere to consist of a single layer only, i.e. a pure cloud layer. Find the results for an overhead sun ($\mu_0 = 1$) and for $\mu_0 = 0.5$. Is δ-N scaling important for the results?

2) Show that the δ-Legendre polynomial representation for the phase function in problem 6.2, page 213, is correctly normalized.