

Lecture 18 (2/28/05)

Electrostatics

18. Many simple identities and notations involving Y_{lm} . e.g.

$$Y_{lm}(\theta = 0, \phi) = \sqrt{\frac{2l+1}{4\pi}} \delta_0^m$$

$$Y_{l0}(\theta, \phi) = \sqrt{\frac{2l+1}{4\pi}} P_l^0(\cos \theta)$$

$$P_l(\cos \theta) \equiv P_l^0(\cos \theta)$$

19. Addition Theorem for spherical harmonics

$$P_l(\cos \gamma) = \frac{4\pi}{2l+1} \sum_{m=-l}^l Y_{lm}^*(\theta', \phi') Y_{lm}(\theta, \phi)$$

$$\cos \gamma = \cos \theta \cos \theta' + \sin \theta \sin \theta' \cos(\phi - \phi')$$

20. Examples of usage.