ADVANCED DYNAMICS — PHY 4241/5227 SOLUTIONS – SET 11

Problem 34: The equation for the redshift is

$$\lambda' = \lambda \sqrt{\frac{1+\beta}{1-\beta}}$$
$$\left(\frac{\lambda'}{\lambda}\right)^2 = \frac{1+\beta}{1-\beta}$$
$$\left(\frac{\lambda'}{\lambda}\right)^2 - \beta \left(\frac{\lambda'}{\lambda}\right)^2 = 1+\beta$$
$$\left(\frac{\lambda'}{\lambda}\right)^2 - 1 = \beta \left[1 + \left(\frac{\lambda'}{\lambda}\right)^2\right]$$
$$\beta = \frac{(\lambda'/\lambda)^2 - 1}{(\lambda'/\lambda)^2 + 1}$$

With $\lambda' = 729.2$ and $\lambda = 364.56$ we find

$$\beta = \frac{v}{c} = 0.6.$$