

Test of Camera Tone Transfer Function (TTF)

A Kodak 20 step reflection gray scale was used to measure the TTF of the camera. The camera was focused onto the step wedge with a field of view covering only about 3 steps. With step 0 (the most reflective step) in the field of view, the f/stop of the camera was adjusted so that the image of step 0 was just saturated (all pixel values = 255). A single image of each step from 0 through 13 was captured using that f/stop setting, and the mean pixel value, P , of each step was measured.

The reflection density values, D , of the steps were 0.05, 0.15, 0.25,...1.35 for steps 0 through 13. The reflection factor, R , for each step is given by equation (1), and a plot of P versus R is shown in Fig. 1.

$$R = 10^{-D} \quad (1)$$

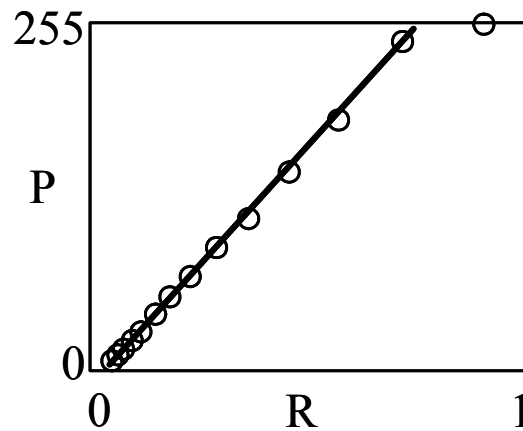


Figure 1: P versus R for the camera.

The camera was saturated at step 0, as shown by the 255 value in the upper right of Fig. 1. The other steps had pixel values below 255 and were used to determine the TTF of the camera. The data was well described by equation (2)

$$P = a \cdot R^\gamma + b \quad \text{with } a = 347.6, \quad b = -9.007, \quad \gamma \equiv 1. \quad (2)$$

The correlation coefficient for this line is $r^2 = 0.9994$. Thus, the camera is well described as a $\gamma = 1$ camera.