Removing Diagonal Stripes from FOC Images

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I. Procedure and Results

The TV scan of the FOC f/96 camera has a defect that leaves a pattern of diagonal stripes across the high-intensity parts of images. (See Fig. 1a.) These have a period of about 4 pixels and can modulate the pixel values by as much as a factor of 2. The stripes cannot be removed by flatfielding, because they are not perfectly regular and are somewhat scene-dependent.

Adorf and Catchpole (1992) suggested removing the Fourier components that correspond to the stripes. We find that although this works on some images it is unsatisfactory for many heavily striped images. The reason is that the striping is multiplicative rather than additive. We therefore take logarithms of the pixel values (after adding a small padding constant), so that subtraction will correspond to division in the original image.

We then follow the method of Adorf and Catchpole: Take the power spectrum of the logarithmic image (Fig. 1c). Identify the offending regions, mark them (Fig. 1d), and make them into a mask. Apply the mask to the complex Fourier transform of the logarithmic image, and transform back. Finally, of course, we exponentiate, and remove the padding constant.

We have found the results to be excellent (Fig. 1b), with no apparent loss due to the missing Fourier components. The result is quite insensitive to the value of the padding constant as long as it is in the right range (about 4 times the level of the worst-striped regions).

We have an IRAF script that leads the user through this procedure. All that the user needs to do is use IMEDIT (when prompted) to mark the bad regions of the power spectrum. Copies can be requested from king@glob.berkeley.edu.

References

Adorf, H.–M., and Catchpole, R. 1992, *HST–ECF Bulletin* No. 17, p. 16

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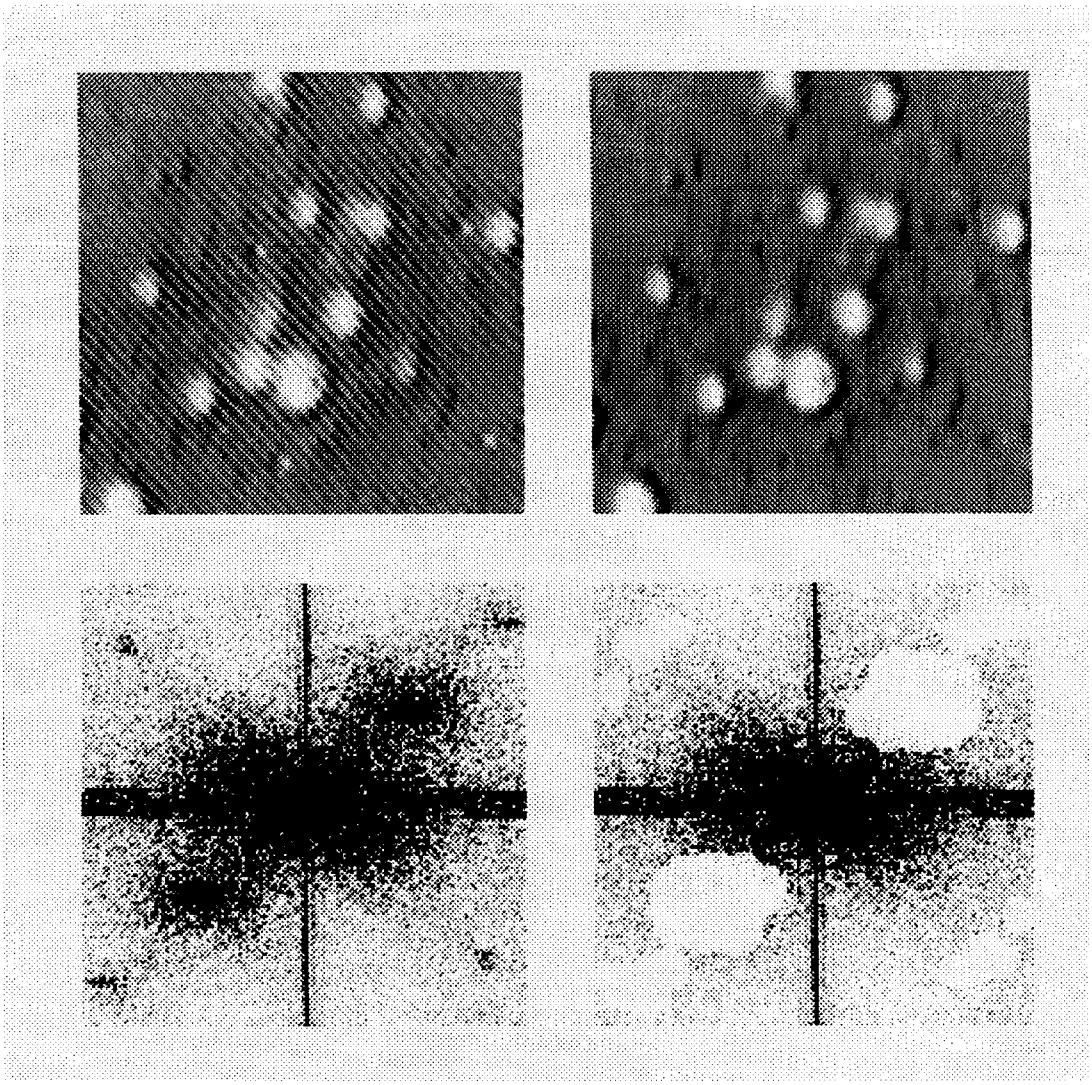

Figure 1: (a, upper left) Central part of a prism image of the center of the globular cluster NGC 6624. Note the diagonal stripes. The white spots are caused by saturation at the centers of strong star images. (b, upper right) The same image, with stripes removed. (c, lower left) Power spectrum of the original image. (d, lower right) Power spectrum of corrected image.