

# Fourier Surface Brightness Analysis of Spiral Galaxies

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The morphological classification of spiral galaxies leaves unanswered questions for their global properties involving gas and dust content, stellar population, and evolutionary process. The difficulty with answering these questions is that they require subjective decision as to what constitute a spiral arm, and how to discriminate structures of different size. It would be useful if we are able to analyze galaxy images by extracting structures of a certain size-scale. We employ FFT image processing techniques for analysis of CCD images of spiral galaxies. We make use of frequency filtering technique to identify structures of any given characteristic size. With a suitable choice of filter type and cutoff frequency  $f_c$ , we can attenuate or enhance low/high frequency component in galaxy images. By comparing radially-averaged power spectra of the original, low pass, and high pass filtered images of a galaxy, we are able to estimate the relative power in the broad size spectrum of various structures. It would mean that one can extract or filter out HII regions of, say few tens of parsecs, or structures bigger than the width of a spiral arm. We will show how Fourier techniques can be made useful to characterize spiral galaxies beyond what can be answered by conventional morphological classification of spiral galaxies.