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Scanning Confocal Microscopy Using CCD and Image Processing XIANJUN YE, MATTHEW MCCLUSKEY, Dept. of Physics and Astronomy, Washington State University, Pullman, WA 99164-2814 — Confocal microscopy has been a powerful imaging technique in both biomedical research and industrial metrology application for decades. In conventional confocal microscopy, a pinhole and photomultiplier tube (PMT) combination is used as the standard detection scheme. The pinhole is placed at image plane in front of the detector to block out-of-focus light, which dramatically improves optical resolution and contrast at selected depth. PMT's fast response time and large dynamic range make it the preferred choice as light detector, especially in fluorescence imaging mode. In this work, we propose a detection scheme using CCD camera to replace the pinhole and PMT combination in reflectance mode. This approach not only reduces the complexity and cost of the system, but also provides extra information about the sample which can be extracted through image processing to improve the resolution. Proof-of-concept experiments are run on a mirror surface and a microchip housing. The reconstructed 3D images not only show the surface topography, but also reveal the inclination of the surface with respect to the optical axis of the microscope.

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