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技术及应用

电荷耦合器件的^{60}Co γ射线和电子辐射损伤效应

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摘要 对东芝公司生产的TCD1209D线阵电荷耦合器件（CCDs）进行了^{60}Co γ和1 MeV电子辐照实验，获得了CCDs的像元信号输出波形、像元光强量化值及器件功耗电流随辐照剂量的变化规律。比较了两种射线产生的CCDs辐射损伤。结果显示，^{60}Co γ和1 MeV电子导致的CCDs辐射损伤不仅在程序上存在差异，而且二者的表现形式也有所不同。分析了电离辐射和位移损伤对CCDs内部不同单元的影响，表明了电子辐照产生的位移损伤是造成上述差别的重要原因。

关键词 电荷耦合器件 _ 位移损伤 γ射线 _ 电子辐照

分类号

Radiation Damage Effect on Charge-Coupled Devices During ^{60}Co Gamma Ray and Electron Irradiation

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Abstract The charge coupled devices (CCDs) TCD1209D that manufactured by Toshiba were irradiated under ^{60}Co γ rays and 1 MeV electron beam (E-beam). The relationship between accumulated dose and the output singnal waveform, intensity of the light and supply current of CCDs was obtained. Meanwhile, the radiation damage induced by γ rays was compared with that induced by E-beam. It has shown by the results that radiation damage induced by γ rays and E-beam is different not only in the damage degree, but also in the forms of damage. Finally, the impacts of ionization damage and displacement damage on different components in CCDs were compared and it has shown that the differences mentioned above are mainly caused by the displacement damage induced by E-beam irradiation.

Key words charge-coupled device _ displacement damage _ gamma ray _ electron irradiation

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