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Theoretical studies on polarization control of segmental undulator system

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Polarization control of undulator radiation attracts a great attention due to its application prospects in material and biology. Various undulators have been developed to obtain radiation of specific polarization states. In the electron storage ring light source, different methods have been proposed to realize a specific polarization switching. However, there is still a strong demanding to improving the switching speed and/or increasing the available polarization state in a single beam line.
This paper gives systematic analysis of simple schemes to obtain the polarization switching by using the segmentation of the undulators with the phase shifter placed between each adjacent undulators. Through switching the polarization state of each undulator and the phase shifts, the polarization state can be fast switched between different polarization states in a same undulator line. The theoretical analysis for the radiation characteristics under different undulator configurations are demonstrated to reveal the basic principle of this simple method.

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