

ABSTRACT

Static magnetic fields, that have a periodic space variation, are referred to as wiggler fields. Typically these fields are used in free electron lasers to control the oscillations of an electron beam. A wiggler field can be created by a wire coil structure or a series of permanent magnets. Such a field is often fixed and cannot be easily altered. This thesis uses a theoretical model to examine how controllable wiggler fields can be generated by switching on a plasma in the presence of a source wave. Different models and energy considerations for wiggler fields are studied. The amplitudes, periods and damping rates of the generated wiggler fields are calculated. Suggestions for further work and applications to free electron lasers are discussed.