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PERIODIC MOTIONS OF A CHARGED PARTICLE IN THE RELATIVISTIC  
REGIME UNDER THE ACTION OF AN ELECTROMAGNETIC FIELD

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We consider the motion of a charged particle under a time-periodic electromagnetic field. After a review of the problem, we will focus the attention on the electromagnetic field generated by an electrically neutral infinite straight wire with a time-periodic oscillating (AC-DC) current. By using global continuation and topological degree, we identify a bi-parametric family of radially periodic motions. The proofs involve some delicate estimations of the induced electromagnetic field, which can be of independent interest.

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