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PROTOTYPE INDUCTIVE ADDER FOR THE PROTON SYNCHROTRON AT CERN

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Several prototype inductive adders (IAs), for use with kicker systems, each with very different specifications, are under construction at CERN. Historically pulse generators for kicker systems use thyratrons and either a Pulse Forming Network (PFN) or a Pulse Forming Line (PFL). The IA has several advantages compared to these conventional pulse generators, including: the use of semiconducting switches instead of thyratrons; the modularity, scalability and ease of including redundancy; and the possibility to actively reduce the ripple to improve pulse quality. In addition, semiconductor switches that can both turn-on and turn-off allow the PFN or PFL to be replaced with a capacitor bank. The IA is a very interesting option for older kicker systems, especially for those where spare PFL is no longer available: the kicker systems of the proton synchrotron (PS) at CERN were built in the 1970s and are thyatron based PFLs. Due to increased need for maintenance and difficulties to source various components, the replacement of the PS kicker pulse generators by a modern technology is a very attractive option. Hence studies have started to design and build a prototype IA for use in various kicker systems in the PS. Thanks to its modular design the design of a prototype IA developed for the Future Circular Collider (FCC) injection system can be readily modified to reach the required output voltage and impedance values for the PS systems. In particular the IA is being considered for three PS kicker systems: the proton extraction kicker systems (KFA4 and KFA71/79) and the proton injection kicker system (KFA45) with a pulse length of 2.1 and 2.4 μs respectively. This paper gives a short introduction to IA technology and discusses the challenges for an IA prototype to meet the PS pulse requirements.

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