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Measurements on Combined 12.5/17.5 kV Prototype Inductive Adder for the CLIC DR Kickers

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The CLIC study is investigating the technical feasibility of an electron-positron collider with high luminosity and a nominal centre-of-mass energy of 3 TeV. The pre-damping rings and damping rings (DRs) will produce ultra-low emittance beam with high bunch charge. To avoid beam emittance increase, the DR kicker systems must provide extremely stable field pulses during injection and extraction of bunches. The DR extraction kicker system consists of a stripline kicker and two pulse modulators. The present specification for the modulators calls for pulses with 160 ns or 900 ns flattop duration of nominally ± 12.5 kV and 305 A, with ripple of not more than $\pm 0.02\%$ (± 2.5 V). In addition, there is a proposal to use the same modulators and striplines for dumping the beam, with ± 17.5 kV stripline pulse voltage. An inductive adder is a very promising approach to meeting the CLIC DR extraction kicker specifications because analogue modulation methods can be applied to adjust the shape of the flattop of the output waveform. Furthermore, the inductive adder can be operated with all or only a portion of the constant voltage layers triggered during the pulse, which allows two different operation modes: 12.5 kV for extraction of the beam and 17.5 kV for the beam dump. Recently, a 28-layer, 12.5/17.5 kV prototype inductive adder has been assembled at CERN and testing has commenced. The goal is test operation with two operation modes. The results of the initial tests and measurements are presented.

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