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NOVEL PULSED POWER SYSTEM FOR INDUCTIVE OUTPUT TUBES

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Inductive Output tubes (IOT) or klystrodes are used to produce RF power in several industrial, research and medical applications. TV broadcasting and industrial heating represent the biggest percentage of these applications. In these cases the RF power is required continuously, and therefore classical IOT power system topologies are based on a high voltage DC power supply, together with several power supplies floating on a high voltage potential.

In linear particle accelerators, Inductive Output tubes are also used to power accelerating structures (e.g. Radiofrequency Quadrupoles). In this case the RF power is only required during a small fraction of time at a certain repetition rate, in pulsed mode. Classical DC topologies are also used in accelerator applications, presenting some drawbacks like excessive size due to isolation requirements, difficulties to ramp-down the high voltage in a few microseconds in case of arc, etc. This papers proposes a new pulsed IOT power system topology which is better adapted for linear accelerator applications, which allows for cost and size reduction. Compared with a state-of-the-art solution based on Solid-State technology, the proposed pulsed IOT power system topology is more compact for applications requiring >50kW of RF peak power.

The paper will first present the proposed novel IOT power system topology and then compare it with an equivalent classical topology. The comparison will be illustrated by means of dimensioning a 100kW IOT power system. Furthermore the design methodology to dimension the different power converters of the system and the operation mode will be reviewed.

Finally, an evaluation of the proposed IOT power system topology for Linear accelerators for Medical applications will also be presented.

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