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Optimized discharge excitation techniques for short pulse gas lasers: TEA CO₂ laser

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Abstract content
   (Max 300 words)

Transversely excited atmospheric (TEA) CO₂ lasers are invariably pumped using pulsers, which transfer the stored electrical energy into the active gas medium. The pulsed power supply for the laser requires efficient switching of the stored energy into the discharge in a very short time and with a well defined spatial and temporal profile. The peak voltage pulse output of the pulser can be as high as 40 kV with electrode voltage rise time less than 100 ns. The conventional primary switches like spark gaps and thyratrons which can withstand these high voltages are limited by lifetime and repetition rate. To circumvent these limitations, multistage magnetic pulse compression circuits which utilize semiconductor switches and step-up voltage transformers are employed. However, in such a system, losses in the core materials must be minimized to improve the system efficiency. For that, Fe-based nanocrystalline ferromagnetic cores, FINEMET, which have a saturation flux density almost as high as Fe-based amorphous materials and core losses as low as Co-based amorphous materials are used for the fabrication of the magnetic switches and the pulse transformers. The dynamic magnetic characteristics of the FINEMET cores are experimentally investigated and the design of an efficient semiconductor switched pulsing circuit, based on magnetic pulse compression will be presented.

Apply to be
 consider for a student
   award (Yes / No)?

Yes

Level for award
 (Hons, MSc,
   PhD)?

MSc

Main supervisor (name and email)
and his / her institution

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Would you like to
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Yes

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