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5P52 - Investigations on an optimized current pulse for pulsed flash lamps dedicated to high energy laser in repetitive mode.

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Increasing the repetition rate of high energy lasers is of great interest for several applications. “Flashdence”is part of a larger program driven by CEA and devoted to the light amplification with Nd-glass pumped by flash-lamps in order to progress on high energy laser technology in the range of 1kJ, 10PW at 1 shot per minute. Increasing the repetition rate of such lasers generates a high thermal stresses on the Nd-glass (amplification plate) which deforms the laser front surface shot after shot. The main consequence is a laser profile inhomogeneous and unusable for the application. Several solutions could reduce this thermal stress. The idea presented here is to reduce and optimize the optical energy transferred form the flashlamps to the amplification plates by decreasing the pulse length of the current pulses feeding the flashlamps to the strict necessary.
CEA CESTA and the SIAME laboratory of Pau University are working in collaboration to develop solutions for a specific energy bank which could generate the appropriate current pulses to flashlamps. In this way, we have built a specific IGBT-PFN which provides 1kA square current pulses to a 100mm xenon flashlamps amplifier. We also have developed a 1kA crowbar branch based on a power thyristor dedicated to a standard RLC energy bank to deliver a bi-exponential current wave to the flashlamps amplifier.
Both of these systems are detailed and compared and we present first experimental results on each one. This work is a first step toward a one scale 300mm Nd-Glass amplifier.

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