High Speed Switch-on of an Image Converter and a Laser Using Optimal Control Methods

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The optical commutation of the current in a semiconductor gas discharge device (infrared image converter) from a low to a high value may be accompanied by high oscillations and by a long transition time. The main dynamic features of the device are described by a two-component model where the feeding voltage serves as a control function. Optimal control methods are used for minimizing the transient time of reaching the high current state. The optimal feeding voltage is a bang-bang control that substantially shortens the transient time and totally suppresses the overshooting in the transient. We discuss optimal control strategies for different constraints on control and state variables and for different parameters in the model. Similar control techniques can be used to minimize the transient time in lasers. We present numerical results that improve heuristic control strategies.
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