

Abstract Submitted  
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**Nonlinear Dynamical Control for Passively Q-switched Lasers**

MARCOS NVE-NSI<sup>1</sup>, ZECHARIAH RICE<sup>2</sup>, MAKHIN THITSA<sup>3</sup>, Mercer University — Q switched lasers are high energy laser pulses of short duration which are prevalent in applications ranging from medical field to optical communication. Passively Q switched lasers do not require external switches for Q-switching since the saturable absorbers doped in the laser material function as the internal switches. One of the main challenges in developing laser material for passive Q-switching is customizing the pulse shape and energy since there are few parameters in passively Q switched laser dynamics that can be influenced externally. In this paper theoretical tools from the field of nonlinear dynamical control systems are applied to design a feedback controller circuit, which can produce a Q-switched pulse with customized characteristics by varying the pump rate, which can be influenced by the pump power. Cr:YSO Q-switched Cr:LiSAF laser is used as an example to demonstrate our method. Both theoretical analysis of the method and the numerical simulation results will be presented.

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