# Controlling the unstable emission of a semiconductor laser subject to conventional optical feedback with a filtered feedback branch

**I. V. Ermakov[1,2*], V. Z. Tronciu[3,1], Pere Colet[1] and Claudio R. Mirasso[1]**

[1]*Instituto de Física Interdisciplinar y Sistemas Complejos (IFISC, CSIC-UIB), Campus Universitat de les Illes Balears, E-07122 Palma de Mallorca, Spain*
[2]*Department of Applied Physics and Photonics, Vrije Universiteit Brussel, Pleinlaan 2, 1050 Brussels, Belgium*
[3]*Weierstrass Institute for Applied Analysis and Stochastics, Mohrenstr. 39, 10117 Berlin, Germany*
**ilya@ifisc.uib-csic.es*

**Abstract:** We show the advantages of controlling the unstable dynamics of a semiconductor laser subject to conventional optical feedback by means of a second filtered feedback branch. We give an overview of the analytical solutions of the double cavity feedback and show numerically that the region of stabilization is much larger when using a second branch with filtered feedback than when using a conventional feedback one.



**OCIS codes:** (190.3100) Instabilities and chaos; (140.5960) Semiconductor lasers

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## 1. Introduction

The control of unstable semiconductor lasers (SCL) has received considerable attention during recent years. For example, the presence of periodic or chaotic oscillations can appear when these lasers are subject to conventional optical feedback (COF). Although the chaotic behavior can be useful in, e.g. chaos based applications [1] these oscillations are, in general, unwanted and must be avoided or stabilized. It is our purpose in this work to stabilize periodic

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