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Parametric instabilities and their control in multidimensional nonuniform gain media¹ MATHIEU CHARBONNEAU-LEFORT, BEDROS AFEYAN, Polymath Research, Inc., MARTIN FEJER, Stanford University — In order to control parametric instabilities in large scale long pulse laser produced plasmas, optical mixing techniques seem most promising [1]. We examine ways of controlling the growth of some modes while creating other unstable ones in nonuniform gain media, including the effects of transverse localization of the pump wave. We show that multidimensional effects are essential to understand laser-gain medium interactions [2] and that one dimensional models such as the celebrated Rosenbluth result [3] can be misleading [4]. These findings are verified in experiments carried out in a chirped quasi-phase-matched gratings in optical parametric amplifiers where thousands of shots can be taken and statistically significant and stable results obtained.

[1] B. Afeyan, et al., IFSA Proceedings, 2003.

[2] M. M. Sushchik and G. I. Freidman, *Radiofizika* 13, 1354 (1970).

[3] M. N. Rosenbluth, *Phys. Rev. Lett.* 29, 565 (1972).

[4] M. Charbonneau-Lefort, PhD thesis, Stanford University, 2007.

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