

ANALYTICAL THEORY
OF FEEDBACK-CONTROLLED PERIODIC
STATES IN PHOTOREFRACTIVE CRYSTALS

*E.V. Podivilov, B.I. Sturman, M. Gorkounov*¹

International Institute for Nonlinear Studies
(1, Koptug Ave., Novosibirsk 630090, Russia),
¹University of Osnabrück

Purdue University
(Department of Physics, University of Osnabrück,
D-49069 Osnabrück, Germany;
Permanent address: Institute of Crystallography of RAS,
59, Lenin Ave., Moscow, Russia)

S u m m a r y

Employment of certain feedbacks in photorefractive optical schemes allows one to realize periodic states (attractors) with ultimately high or low diffraction efficiency. This strongly nonlinear phenomenon has been studied experimentally and numerically. We propose and develop an analytical method for the analysis of periodic states by making use of the symmetry properties of the coupled-wave equations and the high-speed response of the feedback loop. Various periodic states are described in detail. This includes the regions of existence, the period and amplitude of oscillations of measurable output parameters, and the shape of strong non-periodic phase modulation of the input beams.