

INFLUENCE OF RELAXATION ON EMISSION
AND EXCITATION OF COHERENT STATES
OF ELECTROMAGNETIC FIELD
IN THE JAYNES – CUMMINGS
MODEL

E. M. Verlan

Taras Shevchenko Kyiv National University,
Faculty of Physics
(6, Academician Glushkov Prosp., Kyiv 03022, Ukraine)

S u m m a r y

A two-level atom interacting with a field mode is considered. The field frequency is assumed to be equal to the atom transition frequency. The relaxation equations of the atom – field system are written in the basis of dressed states of the Jaynes – Cummings model taking into account quasiresonant pumping. Their solutions are derived for a stationary regime. The average amplitude of a coherent electromagnetic field is found. The account of anharmonic terms under stimulated oscillations leads to a dependence of eigenfrequencies of the atom – field system on the amplitude of stimulated oscillations. As a result, the regions of excitation frequency appear for large pumping amplitudes, where a bistability (when two stable amplitudes correspond to one frequency) takes place. Description of the generation of a coherent electromagnetic field in the basis of dressed states requires neither the concept of inverse population of atom levels nor adiabatic elimination of atomic variables on which the modern theory of lasers is based.