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Effect of Optical feedback on the turn – on dynamics of
quantum dot semiconductor Laser



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Abstract:

The study of quantum cascade laser was carried out using a mathematical model that describes the carriers, in the upper and lower subbands and photon numbers. The Laser output delay time and number of photons affected on by the injection current, relaxation lifetimes of carrier in the upper and lower subbands, the spontaneous emission lifetime and spontaneous emission factor.

Key word : Quantum cascade laser, Upper subband, Lower subband , Photon lifetime ,Output dynamics.

Introduction :

Quantum cascade lasers (QCLs) are semiconductor lasers (SCLs) that emit in the mid – and long wave infrared (IR) bands, and are finding new applications in precision sensing ,spectroscopy , medical and military applications [1 -5]

The QCLs are very different from the standard SCLs. In the standard lasers, operating on inter-band transitions, if one know the electronic structure , one immediately know the wavelength and can easily calculate the gain profile. Usually one only need to know the energy levels. However, in QC structures the question is much more complicated. The energy levels and wave functions are only a starting point for