

**Elliptic equations in unbounded cylinders
with nonpositive zero order terms.
Applications to the behavior of a wave in a
thin beam.**

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We consider a linear elliptic partial differential equation in an unbounded cylinder with a nonpositive term of zero order. We look for solutions which tend exponentially to zero at infinity and for oscillatory solutions which have a potential growth at infinity and when both types of solution exist for the same Dirichlet or Neumann conditions. This type of problems appears when we study the influence of boundary conditions in homogenization, singular perturbation problems and reduction of dimension problems. As an example, we obtain a corrector result for a wave problem in a thin beam imposing initial and boundary conditions. It was known that the initial conditions produce almost periodic oscillations in time. Here, we show that the boundary conditions also produce almost periodic oscillations in the direction of the axis of the beam.