

광통신시스템및네트워크:

1. The propagation of optical pulses inside single-mode fibers can be described by the nonlinear Schrödinger equation. This equation can be simplified by using a normalized amplitude, $U(z, T)$. The following linear partial differential equation can be obtained from the nonlinear Schrödinger equation if there is no nonlinear effect in single-mode fibers.

$$i \frac{\partial U}{\partial z} = \frac{\beta_2}{2} \frac{\partial^2 U}{\partial T^2}.$$

Explain how to obtain $U(z=L, T)$ from $U(z=0, T)$ using the above equation.

2. Find $U(z=L, T)$ when the incident optical pulse at $z=0$ is a Gaussian pulse like the following equation.

$$U(0, T) = \exp\left(-\frac{T^2}{2T_0^2}\right).$$