# Analytical approximations of the nonlinear Schrödinger equation: applications to optical communications and information theory

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The propagation of light in fiber-optic links is governed by the nonlinear Schrödinger equation with variable coefficients. Efficient numerical integration algorithms and analytical models for the evolution of the statistical properties of a stochastic signal are the main ingredients to solve several fundamental problems in the field of optical communication and information theory [1, 2].

Here, we introduce some approximated solutions of the equation and discuss their accuracy, complexity, and possible applications. In particular, as a working example, we consider the evaluation of the maximum information rate that can be reliably transmitted through a nonlinear fiber-optic channel [1, 3].

## References

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[3] M. Secondini, E. Forestieri, *Analytical fiber-optic channel model in the presence of cross-phase modulation*, IEEE Photon. Technol. Lett., 22 (2012), pp. 2016 -2019.