

Lugiato-Lefever model for optical frequency comb generation based on monolithic whispering gallery mode resonators

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Abstract:

We show that Kerr comb generation in whispering gallery mode resonators can be modeled by a variant of the Lugiato-Lefever equation that includes higher-order dispersion and nonlinearity. This model is equivalent to a modal expansion model that was previously derived, and these two models provide complementary information about the generation of Kerr combs. The modal expansion is most useful when the number of modes is small, while the Lugiato-Lefever equation is most useful when there are a large number of modes that interact cooperatively to produce wide-span Kerr combs. We also show that when the dispersion is anomalous, Kerr comb generation can arise as a consequence of Turing patterns leading to the formation of multiple free spectral range combs, or to the formation of dissipative cavity solitons, thus leading to wide-span combs with small pumping.

References:

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