Amalgamation of interacting light beamlets in Kerr-type media - DTU Orbit (26/01/2019)

Amalgamation of interacting light beamlets in Kerr-type media
The interaction of optical filaments in bulk self-focusing media is investigated theoretically and numerically. The nature of this interaction is shown to vary with the incident individual powers and relative phases of the beamlets. By means of virial arguments supported by numerical results it is found that three distinct evolution regimes characterize two in-phase interacting filaments: (i) When each filament has a power below \( N_c/4 \), where \( N_c \) is the critical self-focusing threshold for a single wave, both filaments disperse along their propagation axis. (ii) When their respective powers lie between \( N_c/4 \) and \( N_c \), they fuse into a single central lobe that may self-focus until collapse, depending on their initial separation distance. The critical distance below which a central lobe forms and collapses is estimated analytically. (iii) When their incident powers both exceed \( N_c \), initially separated filaments individually self-focus without mutual interaction. In contrast to in-phase beamlets, two light cells with opposite phase are shown to never coalesce. The extension of the self-focusing dynamics to optical filaments in bulk media with anomalous group-velocity dispersion is discussed. (C) 1997 Optical Society of America.

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