

WIDE-SPECTRUM SUPERCONTINUUM GENERATION IN FIBERS WITH CW PUMP

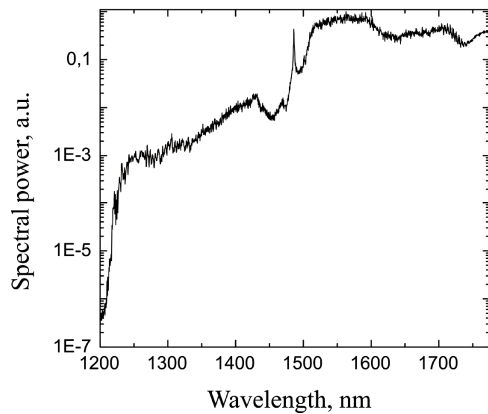
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Modelling of super-continuum (SC) generation has been conducted for highly non-linear fibres (HNLF) pumped with CW radiation, on the basis of the generalised non-linear Schrödinger equation. For the first time a remarkably exact match was achieved of the results from modelling of CW-pumped SC with experiment [1] where a wide-band SC in the 1200–1780-nm range was reported.

It was discovered that generation of wide-band SC results from decay of CW pump radiation into a train of sub-picosecond pulses as an effect of modulation instability. Some of these pulses carry enough energy to transform into optical solitons, which subsequently experience a self-frequency shift. Energy and carrier frequency of the solitons are random parameters because of quantum noise in the pump radiation. A relatively smooth SC spectrum obtained by us from modelling and observed experimentally in [1] comes from averaging of a large number of soliton spectra and the spectrum of short-wavelength non-soliton radiation that is generated because of resonant pumping of energy from solitons.



In the present work we show the possibility to apply the results of the developed method of numerical modelling for optimisation of Raman fibre amplifiers with pumping that is spectrum-broadened because of SC generation in HNLF [2], in particular for substantial (up to 0.1 dB) reduction of gain-ripples in distributed fiber Raman amplifier within a broad spectral region (C- plus L-communication bands).

[1] A.K.Abeeluck, C.Headley, C.G.Jorgensen. *Optics Letters*, 2004, v. 29, N 18, pp. 2163-2165.

[2] T.J.Ellingham et al. *ECOC-2004 Prog., We1.3.4.*, p. 40.