Generation of multicolor soliton complexes in a fiber laser

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A fiber laser scheme has been proposed, simulated, and realized to demonstrate solitons of a new type: Raman dissipative solitons generated via stimulated Raman scattering of dissipative solitons inside a fiber laser cavity. A noisy Raman pulse becomes coherent due to the weak cavity feedback at the shifted (Stokes) frequency. It has been shown that the proposed scheme also offers generation of higher-order Raman dissipative solitons, thus, forming multicolor soliton complexes that offer significant prospects for applications in coherent optical communications and biomedical diagnostics (Fig. 1.1) [1–3].
Fig. 1.1. \(a\) – comparison of the experimental output spectra: DS and Raman pulse in the scheme without feedback (blue) and DS-RDS complex with feedback (red); \(b\) – calculated DS, RDS, and second-order RDS evolution in a PM-fiber cavity with a delay line DL, and a Yb\(^{3+}\)-doped active fiber.