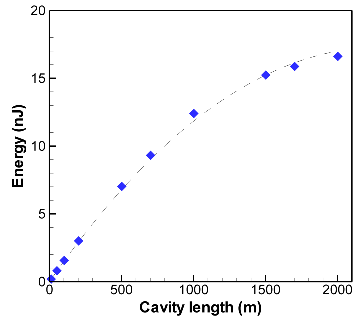

Fig. 7. Output energy dynamics with the cavity length extension for the white noise as an initial distribution. Dashed line is a fit of the following expression: $E = a \cdot L \frac{g_0 \cdot L_{AF} - (R_{in} + \alpha \cdot L_{PF})}{R_{in} + \alpha \cdot L_{PF}}$.

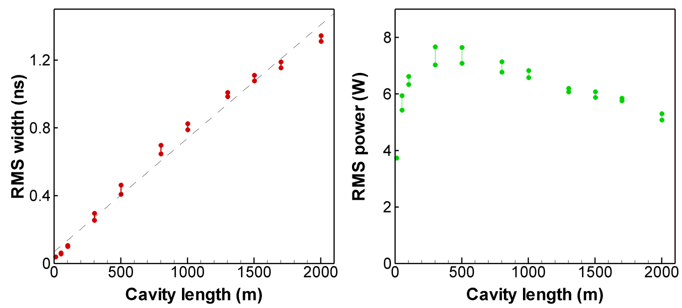

Fig. 8. Dynamics of RMS characteristics with a cavity length extension for white noise as an initial distribution.

cumulative nonlinearity and dispersion respectively [33], one can see the RMS power dynamics presented on the Fig. 8.

4. Conclusion

In this paper we presented the modeling results of the ring cavity passively mode locked fiber laser with the total cavity length up to 2002 m. We have shown that in fiber lasers with the long and ultra-long cavities impact of an initial noise should be taken into account. Use of a smooth initial field distributions can lead to very different asymptotic attractor. We have studied lasing regimes when the increased cavity length leads to increases pulse energy and resulting gain saturation (under condition of a constant small gain). In this case the energy balance adjustment is done via varying out-coupling parameters. We presented an approximate formula describing energy dependence on a cavity length for a considered regime of single pulse generation in long cavity fiber lasers.

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