the device. The delay τ is calculated as previously described in Section 2, for each value of P_{RF}, and the original pulse duration is reduced in the DFB laser and the VCSEL, see Figs. 6(a) and 6(b), respectively. As expected, the shortest pulses are obtained at the highest value of P_{RF}. Their temporal and spectral profiles are shown in Fig. 4 and Fig. 5, for the VCSEL and the DFB laser, respectively.

Shorter durations can be obtained by spectral windowing of the pulse spectrum: if two adjacent zeros are placed close inside the pulse spectrum, shorter pulses are obtained, at expenses of the pulse shape, as satellite pulses appear before and after the main peak.

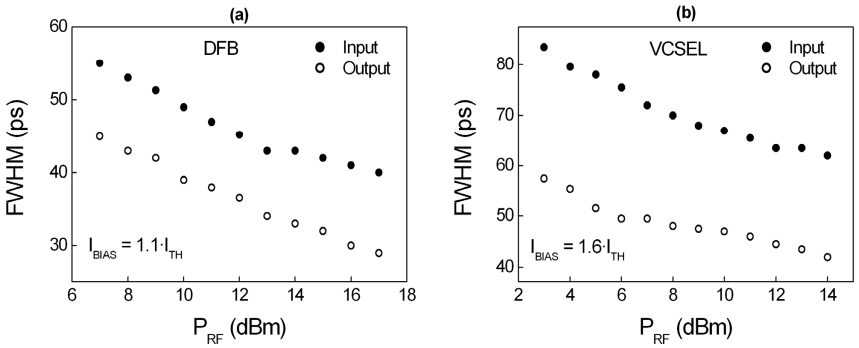

Fig. 6. Pulse durations obtained with the GS DFB laser (a) and the GS VCSEL (b) as a function of P_{RF}, measured at the input (solid dots) and output (hollow circles) of the interferometer. For both lasers, f_{GS} = 1GHz and $I_{BIAS} = 1.1\ I_{TH}$ and $I_{BIAS} = 1.6\ I_{TH}$, for the DFB laser and the VCSEL, respectively.

4. Conclusions

We have confirmed, with simulations and experiments, that a Mach Zehnder interferometer with variable delay can be used for reducing the duration of pulses obtained with GS single mode semiconductor lasers. The variable delay is opportunely set in order to reshape the pulse spectrum, shortening the pulse FWHM duration and tail. An advantage of the proposed technique is that it can be applied to different devices and pulses, by simply varying the delay between the two interferometer arms.

Experiments have been performed with a GS VCSEL and a GS DFB laser, both emitting in the 1.5μm region. The modulation amplitude in gain switching regime has been changed, resulting in pulses with different temporal duration, spectral bandwidth and central wavelength. For all the generated pulses, a reduction of about the 25-30% of the original duration has been obtained, from the DFB laser and the VCSEL, by properly setting the variable delay of the interferometer. An intrinsic limitation of the proposed technique is the intensity loss due to amplitude spectral filtering, in contrast to only phase filtering compression methods, such as pulse compression based on FBG or fiber dispersion. In the performed experiments the pulse attenuation at the output of the interferometer has been measured, giving a relatively small factor of about 0.4.

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