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Title:Generation of long bursts of high-repetition-rate arbitrarily shaped optical pulses using time lens

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Abstract:A technique for the generation of long ultrahigh-speed bursts of optical pulses with arbitrary shapes is proposed. A laser pulse is temporally chirped by a time lens and then passes through a filter with a reconfigurable periodic spectral response, which produces time-delayed replicas of the chirped pulse and recombines them. As a result of the temporal interference between the replicas, the chirped pulse is broken up into short pulses with the shape determined by the chosen filter response. It is demonstrated that the filter acts on a long chirped optical pulse as a temporal modulator with a periodic modulation function. The modulation frequency and bandwidth of the modulator can be much higher than for commercially available high-frequency modulators. The additional advantage of this modulator is the arbitrary shape of the modulation function. A 2.4 ns burst of nearly flat-top pulses with a repetition rate of about 400 GHz is obtained in numerical simulations. In addition, the technique proposed can act as a pulse repetition rate multiplier and a pulse compressor. A repetition rate of 1.589 THz and an individual pulse width of 212 fs are achieved in simulations for a 9.7 ns sinusoidally phase modulated pulse burst. © 2012 Elsevier B.V. All rights reserved.

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