Normalized pulsed energy thresholding in a nonlinear optical loop mirror

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We demonstrate for the first time, the best of our can the best of our can the same of \sim 0.14 $\,$ \sim 0.14 $\,$ d, beee etw.e.P.ebeware ed18 e e e. bandwidth-limited by device

 c . α and α is the use of fiber w.c. ae eare waee -

in the and limited by only the Kerr ea wa cal wa nonlinear (NOLM)

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is a standard interference configuration which a_1 and a_2 cacaa, eafberwither wad eb.a.ca, eawwe afef c-(PTF). See a ecent proposals a readded adectional attenuation at the ring inter f erometer, allowing for the powers of the counterproof the powers of the powers $\begin{array}{llll} \mathbf{w} \mathbf{a} & \mathbf{w} \mathbf{a} \mathbf{e} & \mathbf{b} \mathbf{e} \text{ ad } \mathbf{a} \mathbf{e} & \mathbf{e} \mathbf{a} \mathbf{b} \mathbf{e} & \mathbf{a} \mathbf{b} \mathbf{e} \end{array}$ a_1 e $[19-22]$ $[19-22]$ $[19-22]$ $[19-22]$. Se f-switching and continuous wave $\frac{1}{10}$ $\frac{1}{2}$ H_{NLO} abielie is a bility to $\frac{122,20}{100}$. e eaboe a e daddition to en watesion below the exact defined has bedemonstrated. In this paper, we show for the first time, the best times the first time I of α by α out of α out the this device can perform en e . e d $-d$ $\frac{1}{2}$ d e $\frac{1}{2}$ d e $\frac{1}{2}$ te , dad ψ ee , $-a$ a, above te , d in the same e and $e \vee e$ in the A such that $e \vee e$ is a set of A e. f de cewe ef. \sqrt{m} [\[22](#page-6-1)], e de cewas ed a w passe. f ($\langle \pi \rangle$ e \sim e,.. aby e- π effector (with c include \mathbf{w}_i in \mathbf{w}_i include \mathbf{w}_i

and angel, \Box were considered. Here, we $w \rightarrow d$ e an analytical famework for $w \rightarrow f$ where e energies $\mathbf w$, $\mathbf w$ $\mathbf w$ fe, $\mathbf w$ a ee. afae effect of the attection and team parallel above a π phase shift, a de ed ee e... a^{\prime} e ee a conclusions about \mathbf{w} . ed. \Box in similar device. First, we dereaee. a. fe fc. (ETF) f. eq- \bullet yed \prime are commonly be edd \prime and $a.e.$ We show by equively and experiments. $a = a$ can simultaneously not a simultaneously not a simulated pulse pulse $a = a$ ab_1 e e dad. \mathbf{w}_1 e \mathbf{b} and \mathbf{w}_2 d. We also investigate and characterize pulse dis- α with α equal α feeds of α a_{τ} , e e e a ca e, w, c, we show is a_{τ} dable fa_swaee - e. tedece.

2. Operational Principles

Be m , we derea pulse energy transfergy transferred function for f $t \in \text{DA-NOLM. A}$, $\mathbf{w} \cdot \mathbf{e} \cdot \mathbf{w}$ were the func- \therefore a_r te been easured experience are [\[20](#page-6-3)[,22](#page-6-1)], the ac' a formal and ca far ext. \prime . We be with a a extra metal expression derived [[19\]](#page-6-0). We e ec $-e$ -dependent effects such as dispersion in ϵ , denote bersion ear fibers we earefa \ldots (∼m). We ee Ke effect, we change a change in the induces a change in the index of \mathbf{c}_i $\Delta = \sqrt{2}I$ f and α and α and α and α ceffice \mathscr{P}_2 equipment of the nonlinear fiber. For a NOLM with \blacksquare c. \mathbf{u} a C $(0 \le C \le 1)$ diectional attenuation A, a d c effice Γ (defined a $\Gamma =$ $2\pi L_{\nu}$ ₂/λA_{eff} f fbee length L and effective - de a ea A_{eff}) as shown in Fig. [1\(b\)](#page-1-0), we can write the in s a a e_1 , $\sqrt{m}e$ a fe following in the following $f -$:

$$
P_{\mu} (P) = P \left(\alpha + \beta - 2\sqrt{\alpha\beta} \mathbf{c} \cdot (\phi_{\text{CW}}) \right), \quad (1)
$$

w e e $\alpha = A C^2$ and $\beta = (1 - C)^2$ are the transmitace fee: ew waa wae, $\Gamma_{\rm eff} =$ $\Gamma(2C-1)$ is the effective non-linear coefficient, and $\phi_{\mathrm{CW}} = \Gamma_{\mathrm{eff}}P$ is the phase difference between coun $e \in \mathcal{L}$ there. Although Γ_{eff} , C, and A e , bawaee, dewe dece, . caace. c \ldots c factor and seen equation \ldots c structures. In $c - \omega a$, the NOLM is can be c , deed waee - e ve.

Let c de $-e$ -dependent pulsed in F . For ca., we f - a. edeferable

$$
\Theta(E) = \int_{-\infty}^{\infty} \Pi(-\tau) \mathbf{c} \cdot (\Gamma_{\text{eff}} E \Pi(-\tau)) \mathbf{d} \ . \tag{3}
$$

 \texttt{T} , a very strong dependence on the \texttt{new} \mathbf{w} . e. anne Π (*τ*). T e. meca cae f andeaed eca a $\mathbf{r} \cdot \mathbf{e}$, f ef $-\Pi(\tau) = \frac{1}{\tau}$ ec (7π) **u** . exidtresses the function $\Theta(E)$ and cost Γ reducing $\Theta(E)$. ([1](#page-1-1))] becomes the function $\Theta(E)$ of $\Theta(E)$. (1)] becomes a a_{n+1} .

 $A - e$ ea. $c - de$ for $a - e$ we are

 ψ , ψ in fit end c in wave. This assumption is ad $f \cdot \mathbf{w}$ a ae a \mathbf{w} , aed as \mathbf{w} . a. , a c d w. c. $-e f$ e fe, $-e e$. with elamyate in Summi, expexitated ceae a we fect pulse energy then, a deve we a a fe f c f e f E^* $(E) \equiv$ $\begin{array}{lllllllllllll} \mathbf{w}_1 & \mathbf{e}_1 & \mathbf{a} & \mathbf{w}_2 & \mathbf{e}_2 & \mathbf{a} & \mathbf{b} & \mathbf{b} & \mathbf{c} &$ $\quad \quad \text{if} \quad \text{c} \quad \text{, } \ E_N$

a ade decee eac algorithm. The electronic $S_{\rm{c}}$ w. F. [6](#page-4-0). Tec \sim wed. a a e.g. for Γ $[\text{F} \cdot \text{6(b)}]$ contains a sharp as $\sim \mathbf{w}$, contains a sharp as fwed bafa a Teu**tput** e abo $t_{\rm c}$ e $t_{\rm d}$, as a as a , are $t_{\rm d}$ are A is simulated on a for ed in the b c.e-

cant pelses, the results here can be easily ce t eyea^l wire falled the power θ and θ the equal $\det P_T$

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