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E ect F St ct e D a c T e ac t c I tab t e S -Stab ed C b t

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T e t e ac t c c ca ed b d a c fl /fla e te act a e t ated a a -t b e de c b t - e et t - ate ea e e t t e t ee-c e t e ct fie d, OH a e - d ced fl e ce ce, a d OH* c e e ce ce. T ee e - ea , - tab ed fla e e e e t ated, eac c de e t e -e c ted t e ac t c at . T e t e e et c fl t ct e at eac c d t a a e ca te c e t at c c c bed t e c b t at a e e c t at a de e de t t e (t e) f 25 e , t e te ac eated a a e e e at e t e c at t ce a d fla e e e c t at a e e t e eat- e ea e ate

$\leftrightarrow_{ap}$

Subscripts

a
h
qc

I. I t d ct

C

Θ

D

\$10.00 0001-1452/12 \$10.00

$$\Theta = \int_V \vartheta(\mathbf{x})\,\mathrm{d}V = \int_V \int_T p'(\mathbf{x},t)\dot{q}'(\mathbf{x},t)\,\mathrm{d}t\,\mathrm{d}\mathbf{x} \qquad (1)$$

20 ... 4% ... 1 μm TiO_2 ...

... (1) ... $P_{th} = 7.6$ kW, ... $\phi = 0.55$, ... (1–2 ... 0.1 s ... k (30 ... 0.5 ... 1 s ... (s) ... $p' = 85$ Pa (132.6 ... $f_a = 302$ Hz. ... 2 ... $P_{th} = 10$ kW ... $\phi = 0.65$. ... $p' = 130$ Pa (136.3 ...) ... 305 ... 3 ... $P_{th} = 10$ kW, ... $\phi = 0.75$, ... $p' = 220$ Pa (140. ...) ... 130 ... k ... $S = 0.55$. ... 1 ... 3 ... ([14,26].

... $\dot{m}$ ... 1 ... (ks) ... 1.5%. ...

5). s s s (532 , 2.6 mJ/pulse, 14 s s d t , 20 μs t s s) t t 5 k x d d

t d ls. t s t t d s t s . h. ls. t sht s d t dht 0.7 ht x s s ht d d s. t -s tt d h. t ht TiO_2 s d s ll t d t ht s s 100- ht s s s t t *f*5.6 (k).

h. s t d d st t s t s d s ht s ls. t d -s tt fi t . d s d t ht fi t s t d t t ht d ht s t t ht s s st t d ht h. fl t s t d st t h. t t ht s fi t s t d ht d s d t t t (s t 7)ht t s d ht s t . h. d st t d d t t t s t s d t d t s st s ht s s 7.2 s t k h. s t t s s d t ht fi d s ht s ht ht t ht F d s d t fi d s t d ht t s t ss- t s ht s s 7.2 s t k d t t ss t t h. s s d ht t t x s 64 t 16 x s. d d t 5 k ht sh. d t s s s 512× 512 pixels. h. fi d d ht s st s 32 × 30 mm (s F 1), s t s t s t d t s x t 0. 4 d 0.47 s t h. h. d 2.6 40 6 s t t d s t d t x t 0. s.

C. Pa a La e -I d ced F e ce ce a d C e e ce ce

s - d d fl s s s d t s ht d st t ht s t d d s d t d s t s ht ht s ts. h. F s st s st d h. h. - t t - t d d d F s (d -) t d s (h. s t h. d fi d k h. t) t 5 k ht s d d 3.8 mJ/pulse (1 t t) t 523 ht .5 s s d t h. t t ht d s s d d t d t x t ht $Q_1(7)$ ht - ($v' = 1, v'' = 0$) t s t t 2 3.2 ht ht sh. k d d s t d ht t t t ht d s t 2 3.2 s 0.5 0.1 mJ/pulse. h. s s d t ls t ht h. h. t x t 40 d st x t 0.4 s ht d s s. h. x s t s s d s ht ht ls ht k ss, h. h. s ht t s t h. s ls t s d ht ht s ls. t s d h. d s t t ht t s t s t ht s ht .

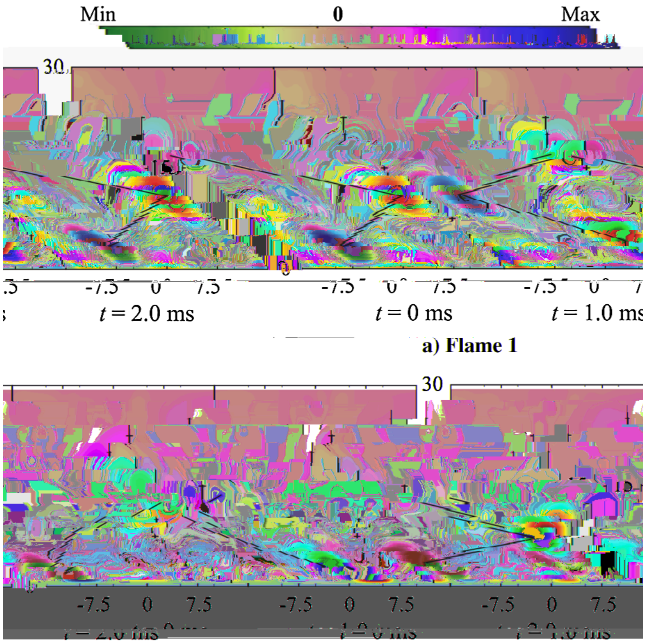
F s ht d ht 310 s d ht (s 6) d ht x t t -st s- d t s fi (s -) d 45 *f*1. s ( ). h. t s fi t t s s t t

500 s dht F s s d t ht fi s t d s d s s s h. h. fi d d ht F s st dht t dht ht s t h. (5) d x t d d ht x t t h. h. t 40 .

k d s t d s t s tt d d s 500 s t s fi t h. h. -t s ss (t ht 0% t 310) d ss t fi t (s ts), d ss fi t (1- ht k 2 5 h. tt ss). h. s t d ht s ls t t s t fi h. h. s d t d s d 1000 s ht fl s t ht t s d d t ht t s t t s s d t ht fl s t h. F s fi t d ht 0.4 ss fi t (s dht s ht ls t ht k ss) ht s s t d h. h. - x s .

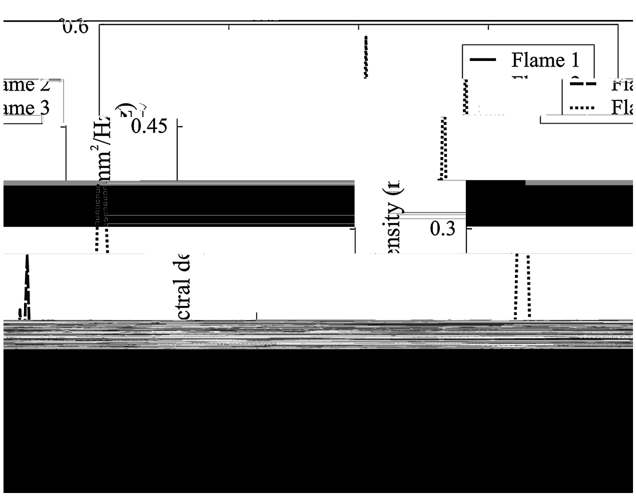
ht h. t s ht s fl s ht s (14 ht h. t s t sht d t ht fl s dht t t t . d s x s t t s h. t s (ht fl s s), t s h. t s s t t x t 1500 (27 h. F s d s ht x s ts s d d st t d s h. t h. ht fl s d ht s s d t ht ht ht s s s d ht h. t s t s t t s x k t t s t ht s tfl s s. ht fl s s ss t d ht s h. h. d t t t (31 d d s t ht t d t ht fl t h. d d t t ht t t s s t s s d ht s d t d fi t h. s ht s s h. t t ht t - h. ht t s h. h. h. s t t d s d d t d fi d t $f(\varphi) = x_f(\varphi)\hat{e}_x + y_f(\varphi)\hat{e}_y$, h. $\hat{e}_x$ d $\hat{e}_y$ ht s t t t s ht d d x d t s. h. ht s t d t t d d s d x t ls d s d t s t h. t s x t s d t ts. t s t dht ((t d)-2 d) [illegible] $(\overset{\leftrightarrow}{\cdot})$, [illegible] 2. [illegible] 50% [illegible] 3.

[illegible] 3 [illegible] $(f_h > f_a)$ [illegible] 31 [illegible] f_a [illegible] x_{qc} [illegible] $(f_{qc} = f_h - f_a)$ [illegible]



F . 5 D a c t e l e ca te c e ec t cted t e e t –10t de t e POD fla e 1 a d 3 ($u_{10}(t)$), b t c ad e e c e a ate 500 H . T e HVC c c c bed t e e 2 a d t e HVC fla e 3 e bted a a d a c t at e e e d c e t e t e ac t c c e. T e fl a ed te t e e ed t c t ω_z bet ee −20, 000

$f_{qc} = 207$ Hz, ($f_h = 515$ Hz) ($f_a = 308$ Hz). . 6 2 3 1 2 1 3.



F . 6 P e ect a t e ad a cat t e te t - e ted eat- e ea e ce t d a fla e (x_{qc}).

IV. D b -P a e-Re ed A a

(ϕ_a) (ϕ_h) ζ $\overleftrightarrow{\zeta}$, $\zeta^{ap}(\phi_a, \phi_h)$, $\zeta'(t)$,

$$\zeta(t) = \overleftrightarrow{\zeta} + \zeta^{ap}(\phi_a, \phi_h) + \zeta'(t) \tag{2}$$

. 7, 64 . 7.

$$\overleftrightarrow{\zeta}^{ap}(\phi_a, \phi_h) = \overleftrightarrow{\zeta} + \zeta^{ap}(\phi_a, \phi_h) \tag{3}$$

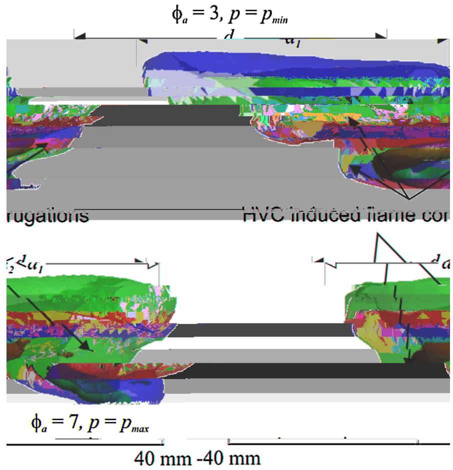
$\overleftrightarrow{\zeta}^{ap}(\phi_a, \phi_h)$, $\zeta = \mathbf{u}$ $\zeta = \Sigma$. (A_f) (δV) $\Sigma = \delta A_f / \delta V$. 2×2 mm

V. O'c at 'F a d'F a e D a c

A. Q'a tat e A'a HVC a d'F a e Be a

[illegible] ϕ_a, [illegible] ϕ_h [illegible] 3- [illegible] ϕ_a. [illegible] $\phi_a = 3$, [illegible] $\overleftrightarrow{u}_y^{ap}$ $(\phi_a = 3, \phi_h = 1 \ldots 8)$ [illegible] 3- [illegible] 3- [illegible] ϕ_a, [illegible] 3- [illegible] ϕ_h $(\phi_h = 1$ [illegible] $)$, [illegible] 3- [illegible] f_h.

[illegible]



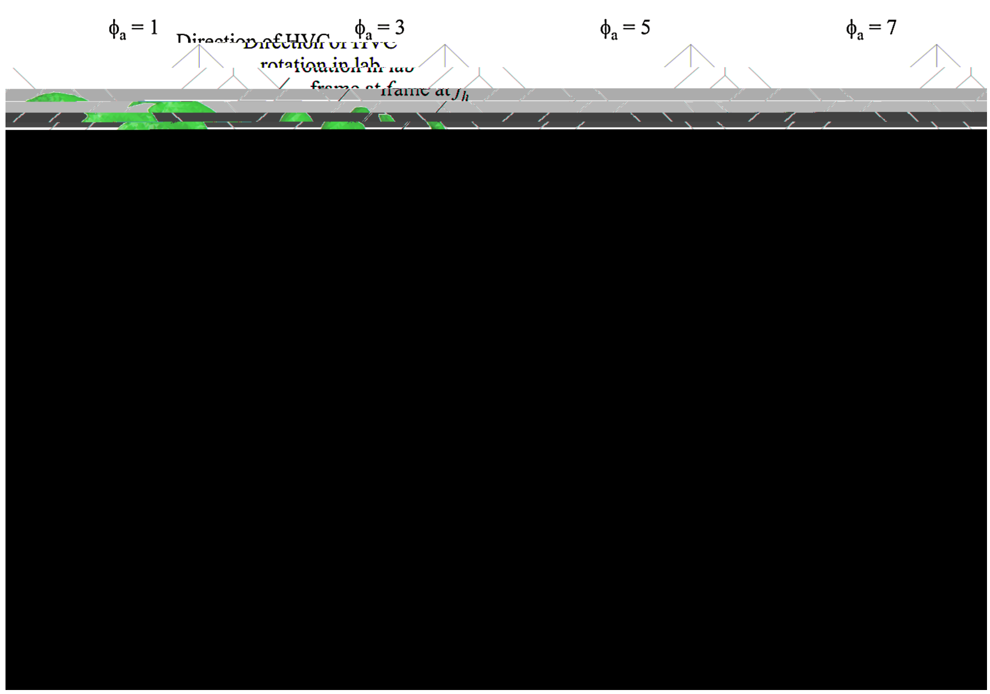
F . 10 Mea ed te act t e HVC ($\overleftrightarrow{\omega}_z^{ap} = 5000\ \mathrm{s}^{-1}$) t t e fla e ace de t fie d (e e e tat e ace $\overleftrightarrow{\Sigma}^{ap} = 0.12\ \mathrm{mm}^{-1}$) fla e 2. T e d a c de at t e HVC ca e c a a e- ca e c at t e fla e.

[illegible] (11) [illegible] Fig. 11 [illegible] $\phi_a = 1$ [illegible] 7 [illegible] $\phi_a = 1$ [illegible]

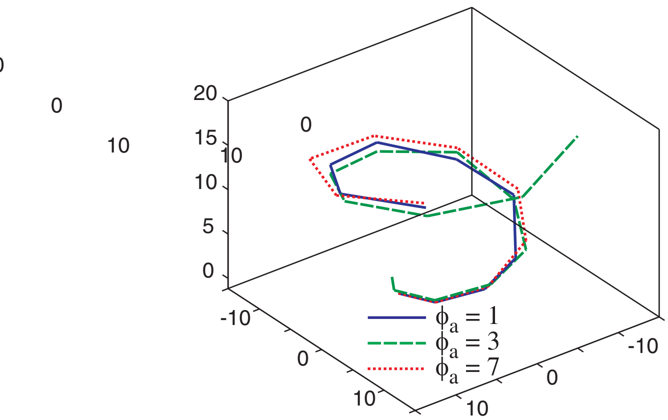
[illegible] Fig. 10 [illegible] Fig. 11 [illegible] Fig. 10 [illegible] 2. [illegible]

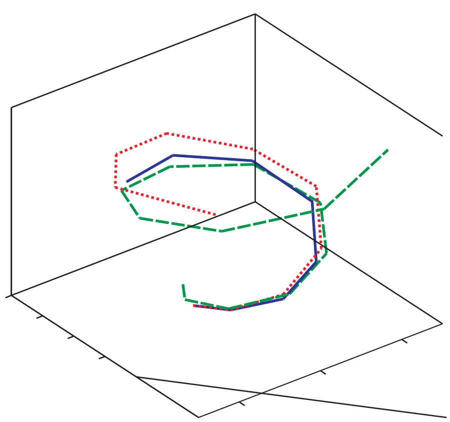
B. Q a t ficat HVC Be a

[illegible] $\overleftrightarrow{\omega}_z^{ap}$ [illegible] Fig. 12 [illegible] $\phi_a = 3$ [illegible] $\phi_a = 7$ [illegible] $\phi_a = 3$, [illegible] 1 [illegible] 2 [illegible] 3 [illegible] 1 [illegible] 3. [illegible] Fig. 13, [illegible] (y_h) [illegible] (θ_h) [illegible] ϕ_a [illegible] $\phi_a = 1$ $(p = \bar{p}$ [illegible] $\mathrm{d}p/\mathrm{d}\phi_a < 0)$, [illegible]



F . 11 Mec a ca t e eat e ea e t c c c be t e c b t at f_{qc}. I a e a e fla e 2 a d a e a HVC-fi ed a e t at tate t e ab at a e at f_h.





ht y_h ... s t ... h. h. θ_h, s ... sht ... s t ... h. ... ss ... d ... d $(\phi_a = 3)$, ht ... ht ... x ... ll ... t ... t d, s ... t ... ht ... s t ... h. x ... h. fl ... ll, ht s s ... ss ... s, fi sht ... ht ... x ... x t d d $(\phi_a = 5)$, ... d ... ht ... $(\phi_a = 7)$. ll ht s tt ... ss ..., ht ... s ... ts ... s t x ... x t d d ... fi ... t ... h. s d ... t sht t x ... d ... ht ... s s ... ll ... ht d ... t ... t s ht h. x ... d s ... d ... d ... t d ... t s ... t d ... t h. s s ht ... ss ...

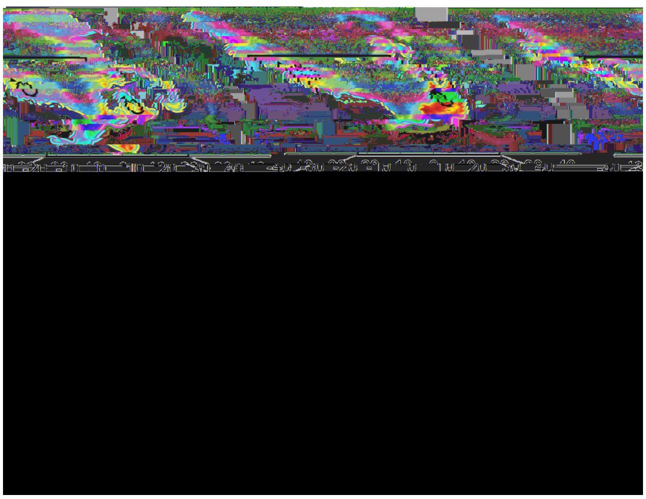
h. s s s d ... s t t d ... F ... 14, h. h. ls ... sht ... t ... d s ... t ... t ... ts ... ht ... h. x ... ht

ht ... s t ... fl ... 1, ht ... sls ... d s h. ht t t ... s ht ... fi d ... s ... s ... s ... s ... ts ... ht ... ls ... t $\theta_h = \pi, 2\pi,$ d 3π. F ... s ... s ... ht ht fl s s ... s ... s ... s t d ... t ... d s t ... t s d ... t x d s ... t s ... t s t ... d ... th. s s ht ht ... s t ... t ... ht ... k ... d s ... ts s s ... ts ... s ht x ... d ... t ... t d d t ... x t $\pi/4$ t ht ht ... s t ... h. s ... s d s ... t ht ... t ... t ... t ... s ... s, d ... t ht ht ... d ... s d ... t ... ss. h. ... t d ht x d ... t ... s ... s t ... s ... ht ht ... t d ht ht ... s t ... s t s. ... ht ... x t ... ss ht ts sht h. s ls t d ... t d s t tk ... F ht ... s ... ts ht ... fi d ... d ... t s t ... h. ... ht s h. ... s ...

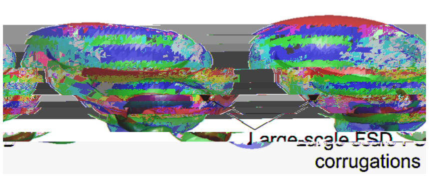
C. Pe d c F /F a e I te act

h. ... s s h. s d ... s t t d ht ... x d ... s ... h. ... t x ... s ht ... s t ... ll ... s ... ll t ... s ... fl ... s

($\phi_a = 7$)



F . 16 T ca ta ta e ea e e t t e OH fie d, fla e t a , a d t c t fie d at t e a d a t e e e at fla e 1. ω_z bet ee −20, 000 s^{-1} a d 20, 000 s^{-1}, t t e ca e e F . 5.

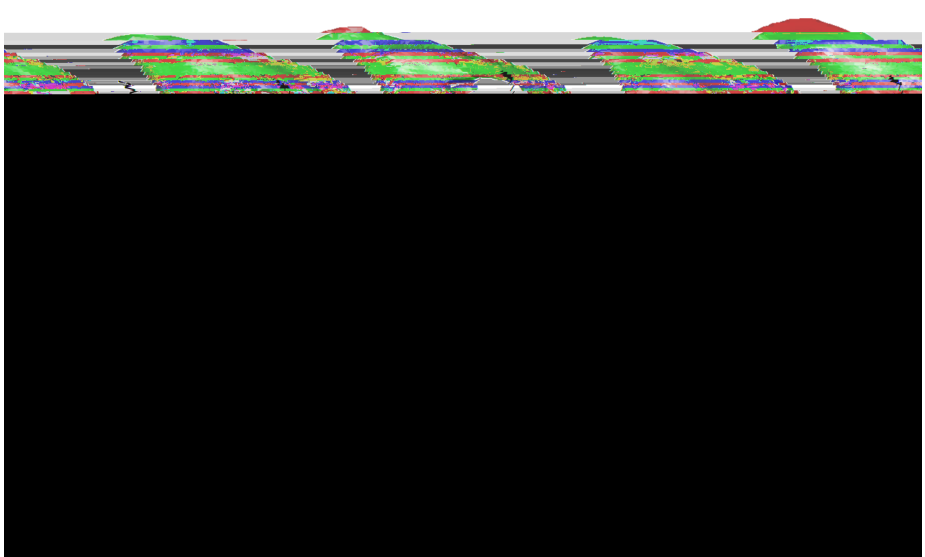


F . 17 Rec t cted HVC ($\overleftrightarrow{\omega}_z^{ap} = 5000$ s^{-1}) a d fla e ace de t ($\overleftrightarrow{\Sigma}^{ap} = 0.12$ mm^{-1}) fla e 1 at $\phi_a = 3$ ($p = p_{\min}$) a e- ca e c at a d e e t e t t a F . 15.

F . 19 T ca ta ta e ea e e t t e OH fie d, fla e t a , a d t c t fie d at t e a d a t e e e at fla e 3. ω_z bet ee −20, 000 s^{-1} a d 20, 000 s^{-1}, t t e ca e e F . 5.

($\phi_a = 3$)

VI. T e ac t c C



F . 18 Rec t cted HVC ($\overleftrightarrow{\omega}_z^{ap} = 5000$ s^{-1}) a d fla e ace de t ($\overleftrightarrow{\Sigma}^{ap} = 0.12$ mm^{-1}) fla e 3 e t e t e ac t c c c e.

$$\Psi = \int_V \psi(\mathbf{x})\,\mathrm{d}V = \int_V \int_0^{2\pi} p'(\phi_a)\overset{\leftrightarrow ap}{\Sigma}(\mathbf{x},\phi_a)\,\mathrm{d}\phi_a\,\mathrm{d}\mathbf{x} \qquad (4)$$

... 23 ... (Ψ_p) ... (Ψ_n) ... (4) ... $\psi(\mathbf{x}) > 0$ ... $\psi(\mathbf{x}) < 0$.

... 1 ... 2 ... 3 ...

VII. C[illegible]c[illegible]

[illegible]

[illegible]

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