**ТОКТОБОЛОТ АБДУМОМУНОВ**

# *АБИЙИР КЕЧИРБЕЙТ*

пьеса

Бишкек - 2014

J b . k 1 . K o _ f k Z b k l _ f u b d j h \ h e g h q j Z [ ] h j : \ Z
l i j y f h m ] h e v \ g h u e o g h ; \ l h ^ j _ a h g Z _ l l h j d _ j Z f b q _ k h d [ h j Z _ h a p Z
1 \ o h ^ g h k _ q _ g \ b e g h ; h 2 ^ Z i h j r _ g ^ e y g Z k l j h d k d b k l _ ; f u
3 h l \ _ j k l k b \ y a \ b e g h \ h k ^ Z a h g Z l . h j h f

g h c ^ _ d Z j l h \ k h b c k l _ f u d h e h j ^ b g j Z y , z )
( j b . k 1 ) ; d h g n b ] m j Z v p e b _ y d l j h f Z ] g b i h g h ] h
e y \ j _ a h g Z l h m j i j _ ^ _ e y _ \ l h k e y g h \ h ^ g h c
$H_{10}$ - \ h e g h $\vec{E}(0; E_y = E; 0)e^{i(\omega t - kz)}$, $\vec{B}(B_x; 0; B_z)e^{i(\omega t - kz)}$.

L h ] ^ k Z l Z p b h g Z j m g j l Z \ g _ g j Z b e Z g w k g Z - _ j
] b b \ d _ j Z f b l d i j b \ _ ^ _ g \ g h e g h \ m j _ Z \
g _ g h a _ Z i b r m \ k y ^ : _

$$\frac{\partial}{\partial x}\left(\lambda\frac{\partial T}{\partial x}\right)+\frac{\partial}{\partial z}\left(\lambda\frac{\partial T}{\partial z}\right)+\frac{1}{2}\omega\varepsilon_i\varepsilon_0 E^2 = 0 ; (1)$$

$$\frac{\partial^2 E}{\partial x^2}+\frac{\partial^2 E}{\partial z^2}+\frac{\omega^2}{c^2}(\varepsilon_r - i\varepsilon_i)E = 0. \qquad (2)$$

A ^ _ k $\vec{E}$ v $\vec{B}$ g Z i j y ‘ _ g g h w k e v _ d l j b q _
k d h ] h b g ^ m d p Z b y g b l g h j h e ; c l _ f
i _ j Z l m j ω Z = 2 π f ; f q Z k l h w Z e _ d l j h f Z ]
g b l g h j h e ; y k = $\sqrt{(\omega/c)^2 - (\pi/a)^2}$ i j h ^ h e v
g h _ \ h e g h \ h q _ b k e h \ h e g h \ ; h ^ λ _
l _ i e h i j h \ h ^ g h k = $\varepsilon_r - i\varepsilon_i$ d h f i e _ d k g Z y
^ b w e _ d l j b q _ i k j d Z h y p Z _ f h k d l _ v j Z f b ; d b
$\varepsilon_0$ w e _ d l j b q _ i k h d k Z h y y g g c Z y k d h j h k l v
k \ _ ; l Z f g b f Z _ y ^ b g b p Z

= j Z g b q g m u k _ e h \ b y f i _ j Z l m j g l h e _ _
j Z k k q b l u \ Z b _ a r k j y Z \ g _ ( d ) b y h e v d h d -
j Z f b q _ k d h [ j f Z a p g _ Z ] j Z g b p d _ h l h j h [ j h Z
\ y l k y m k e h \ l h j y l v _ ] j l h ^ Z l _ i e h h [ f k g
h d j m ‘ Z x s \ b h f a ^ m o a h Z f ^ Z g b g _ h f c i _ j Z l m j u
$L_0$:

$$r = R : -\lambda\frac{\partial T}{\partial x} = \alpha(T - T_0),$$

] ^ _ d h w n n b p l b _ i g e l h h l ^ Z Z q p b b e b - g ^
j Z k ] h j b a h g l Z j e Z / k g i h e h ‘ _ g h g k h v c x ^ e y
k \ h [ h ^ g h e Z Z f b g Z j g d h h c g \ _ d p j Z Z k k q - b l u
\ Z _ l k k y n h j f m e [ Z ] f

$$Nu = 0.47(Gr\cdot Pr)^{\frac{1}{4}}, \quad Nu = \frac{\alpha L}{\lambda}.$$

A ^ _ k h $Pr = \mu C_p / \lambda$ q b k e h j Z g ^ l ; e y
$Gr = g\beta\rho^2\Delta T L^3/\mu^2$ q b k e + h j Z K ] h ; n N Z u
q b k e G m k k _ ; e y , $\mu$ , $C_p$ , $\beta$ ^ b g Z f b q _ k d Z y
\ y a d h , k n h v ^ _ e v b g Z i y e h _ f d , h k _ l f v i _ j Z l - m j
g u c d h w n n b p l b [ t g _ l f g h j ] Z i k r b j _ g \ b h y a
^ m ; o g Z m k d h j _ k g b b e _ u y ‘ _ k ; l b a $T = T - T_0$ ;
$L = 2R$ o Z j Z d l _ j p Z u a c f _ k j b k l _ . f u

J b . k 1 . K o _ f k Z b k l _ f u b d j h \ h e g h q j Z [ ] h j : \ Z
l i j y f h m ] h e v \ g h u e o g h ; \ l h ^ j _ a h g Z _ l l h j d _ j Z f b q _ k h d [ h j Z _ h a p Z
1 \ o h ^ g h k _ q _ g \ b e g h ; h 2 ^ Z i h j r _ g ^ e y g Z k l j h d k d b k l _ ; f u
3 h l \ _ j k l k b \ y a \ b e g h \ h k ^ Z a h g Z l . h j h f

g h c ^ _ d Z j l h \ k h b c k l _ f u d h e h j ^ b g j Z y , z )
( j b . k 1 ) ; d h g n b ] m j Z v p e b _ y d l j h f Z ] g b i h g h ] h
e y \ j _ a h g Z l h m j i j _ ^ _ e y _ \ l h k e y g h \ h ^ g h c
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] b b \ d _ j Z f b l d i j b \ _ ^ _ g \ g h e g h \ m j _ Z \
g _ g h a _ Z i b r m \ k y ^ : _

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A ^ _ k $\vec{E}$ v $\vec{B}$ g Z i j y ‘ _ g g h w k e v _ d l j b q _
k d h ] h b g ^ m d p Z b y g b l g h j h e ; c l _ f
i _ j Z l m j ω Z = 2 π f ; f q Z k l h w Z e _ d l j h f Z ]
g b l g h j h e ; y k = $\sqrt{(\omega/c)^2 - (\pi/a)^2}$ i j h ^ h e v
g h _ \ h e g h \ h q _ b k e h \ h e g h \ ; h ^ λ _
l _ i e h i j h \ h ^ g h k = $\varepsilon_r - i\varepsilon_i$ d h f i e _ d k g Z y
^ b w e _ d l j b q _ i k j d Z h y p Z _ f h k d l _ v j Z f b ; d b
$\varepsilon_0$ w e _ d l j b q _ i k h d k Z h y y g g c Z y k d h j h k l v
k \ _ ; l Z f g b f Z _ y ^ b g b p Z

= j Z g b q g m u k _ e h \ b y f i _ j Z l m j g l h e _ _
j Z k k q b l u \ Z b _ a r k j y Z \ g _ ( d ) b y h e v d h d -
j Z f b q _ k d h [ j f Z a p g _ Z ] j Z g b p d _ h l h j h [ j h Z
\ y l k y m k e h \ l h j y l v _ ] j l h ^ Z l _ i e h h [ f k g
h d j m ‘ Z x s \ b h f a ^ m o a h Z f ^ Z g b g _ h f c i _ j Z l m j u
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] ^ _ d h w n n b p l b _ i g e l h h l ^ Z Z q p b b e b - g ^
j Z k ] h j b a h g l Z j e Z / k g i h e h ‘ _ g h g k h v c x ^ e y
k \ h [ h ^ g h e Z Z f b g Z j g d h h c g \ _ d p j Z Z k k q - b l u
\ Z _ l k k y n h j f m e [ Z ] f

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q b k e G m k k _ ; e y , $\mu$ , $C_p$ , $\beta$ ^ b g Z f b q _ k d Z y
\ y a d h , k n h v ^ _ e v b g Z i y e h _ f d , h k _ l f v i _ j Z l - m j
g u c d h w n n b p l b [ t g _ l f g h j ] Z i k r b j _ g \ b h y a
^ m ; o g Z m k d h j _ k g b b e _ u y ‘ _ k ; l b a $T = T - T_0$ ;
$L = 2R$ o Z j Z d l _ j p Z u a c f _ k j b k l _ . f u

> e y i j b \ _ ^ _ g g h h j k e g h \ h m j h j Z \ g _ g b y b e h ^ b k k b i b j m _ \ f d m _ j x Z f b f d h _ s g h k l v

(2) ] j Z g b q g m u k e h \ k d l Z \ y l k h y \ k _ f m d h - g l m j m Z k q _ l g h h [ e Z k l b

- \ h \ o h ^ g h k f _ q _ g h b ^ b g h f h ^ h \ i h j y l h h - m ] h e v g h h j k e g h \ h ^ Z k m i _ j i h a b i p Z b y ^ Z x s _ k c Z f i e b l m ^ E_R e^{-ikz} - \ h e g

$$E = [E_i \exp(-ikz) + E_R \exp(ikz)]\sin(\pi x/a) \qquad (3)$$

i j _ h [ j Z a m d _ \ l k ^ y m m k e h \ b b a y e m q : _ g b y

$$\frac{\partial E}{\partial z} - ikE = -2ikE_i \exp(-ikz)\sin(\pi x/a),$$

- g Z k l _ g d d Z h o g _ q g j g h c \ h ^ b f h k j _ l b a h - g Z l h j Z k l Z \ y l k j y Z g b q g m u k e h \ E y h g l h \ b q [ 8 ], d h l h j u \ _ j Z k k f Z l j b \ Z _ k f e h m f q Z a Z i b r m l k y ^ : _

$$x = 0; h \mid z = 0; l: \ \vec{E} = \frac{Z}{\mu_0}\vec{B}\times\vec{n},$$

] ^ _ $Z = (1+i)\left(\frac{\omega\mu_0}{2\sigma}\right)^{1/2}$ i h \ _ j o g h k l d b f c i _ ^ Z ; g k x w e _ d l j h i j h \ h ^ f g Z h l k _ j v b Z e Z k l _ g h j d _ a h g Z ; l m j Z \ g _ r g y g y h j f Z e d v ] j Z g b p m [ e Z k h h b j _ ^ _ e _ i g h b e y y $\mu_0$ f Z - ] g b l g Z l y k l h y g g Z y

- g Z b ^ _ Z e v i g h h \ h ^ y s l k o _ g d Z h o e g h - \ h ^ Z b i h j r g : y E = 0 .

F _ l h ^ j _ r _ g . b y > b k d j _ l b a Z m p j Z Z \ + g _ g b (1 2) i j h b a \ h ^ b f l _ k l y h ^ h o f h g l j h e v g u o h [ t _ f h [ 9 ]. G _ e b g _ c ^ g b u k _ d j _ l g Z u g _ Z e h ] b i j b \ _ ^ _ g g \ h h ] k e g h \ h m j h j Z \ g _ g b o m y j Z \ - g _ g b y j Z e Z g w k g Z _ j ] b _ b r Z x l k g y Z d Z ' ^ h b c l - _ j Z p b b h k e _ ^ h \ Z l _ f e _ v l g ^ h h b k d e x q _ g b y = Z m . k k l Z h k d h e v d i j m b \ _ ^ _ g g l h h _ e g h \ h _ m j Z \ g _ g h b i j _ ^ _ e y g _ Z i j y ' _ g g h k w l e v - _ d l j b q _ k d h h ] k e y k l h q g h k l ^ v h x i j h b a \ h e v g h ] h i h k l h y g g f h g l h ' b l _ , e l y h ] j Z g b q g m h - k _ e h \ b g _ Z \ o h ^ \ _ h e g h \ h a ^ Z Z f _ g y _ k l h k y l - g h r _ g b _ f z = z_0 : $\tilde{E} = \sin(\pi x/a)$. I h e m q _ g g h _ ] ^ _ q b k e _ g i _ h r _ _ g b $\tilde{E}(x,z)$ f Z k r l Z [ b j m _ l k y i h e m \ h e m g l e Z ^ u \ Z x s g h Z o l k j y b g h , ^ e - b g _ l b \ u k h b _ j _ a h g Z l k h h j Z l \ _ l k l \ _ g g h

$E(x,z) = K_E\tilde{E}(x,z)$ k d h w n n b p b _ K g _ l h f i - j _ ^ _ e y _ f o u _ f j _ f a \ s g h k l Z ^ Z x s \ h c e g u

$$P_i = \frac{kE_i^2}{4\mu_0\omega}ab, \quad K_E = E_i/\tilde{E}_i(a/2, z_0)$$

$$P_D^c = b\iint_S \frac{1}{2}\sigma|E|^2\,dxdz, \quad K_E = \sqrt{P_D^c/\tilde{P}_D^c},$$

] ^ _ S i e h s Z ^ k v _ q _ g d b _ y j Z f b q _ k d h b ] h e b g ^ ; j Z f i e b l m $\tilde{E}_i$ u $\tilde{E}_R$ \ u q b k e y x i l k y k e _ ^ m x s b b a k h h l g h r _ ( 3 ) b n y h j f m e Z f

$$\tilde{E}_i(a/2, z_0) = -\frac{\partial\tilde{E}/\partial z - ik\tilde{E}}{2ik\sin(\pi x/a)}e^{ikz};$$

$$\tilde{E}_R(a/2, z_0) = +\frac{\partial\tilde{E}/\partial z + ik\tilde{E}}{2ik\sin(\pi x/a)}e^{-ikz}.$$

D h j j _ d l g h q k h u k e _ g d k h u ] _ h l d Z h g l j h - e b j m _ l k j y h \ _ j d h b o g l _ ] j Z e v g Z h e ] Z g w k g Z - _ j ] b b \ b ^ : _

$$P_i = P_R + P_D^c + P_D^r,$$

] ^ _ i j b g y l Z h \ g b f Z g b ^ _ Z e v i g Z l y h ^ b f h k l v k l _ g h \ h e g h \ h b ^ Z h j r g , y Z i h ] e h s Z _ f Z j y _ a h g Z l h f h e s g h k l \ u q b k e y _ l k y d Z d h l h d \ _ d l h j Z f h \ - Z l h c g l b g ] k Z d \ h a v k l _ g d _ b a h g Z l h P_D^r / P_i = Z \int (\vec{E}\times\vec{B}/\mu_0)\cdot d\vec{s}.$$

J _ a m e v J Z l j u n \ h ^ b l k j Z k q _ k l Z p - b h g Z j g u b _ i e h \ u k h k l h y g d b _ c j Z f b q _ k d h ] h h [ j Z a p k Z i _ q _ g g h m c b k Z e x f b g b $Al_2O_3$ (i e h l g h k l 9 7 %) ^ e y k e _ ^ m x s a b g o Z q _ g b c \ g _ r g b i Z j Z f _ l j a Z ^ Z f q - b 1 0 = = ; p Z = b = = 2 0 f f ; R = 8 f f . N b a b q _ k k d l b _ c k l d Z j Z f b q _ k d h f Z h _ j b Z \ e a Z y l u b a [ 4 ]. F Z l _ j b Z e k l _ g h j _ d a h g Z l h f j _ Z ^ . v

***Резонатор без керамического образца.***

> e y Z i j h [ Z p k l b k e _ g g j h Z e b a Z w v e - b d l j h ^ b g Z f b q _ k a d Z h ^ Z i j h \ h ^ b l k j Z k q _ l o Z j Z d l _ j b w v l e b _ d d l j h f Z ] g b i h g e h y ] h m - k l h f ( [ _ a d _ j Z f b q _ k d l h j ] Z h a ) p j Z _ a h g Z , l h j _ d h l h j u c h ' g h j Z k k f Z l j b \ Z d l Z v d i j y f h m ] h e v g \ u h c e g h \ a ^ Z d h j h q _ g g Z u h c [ h b o d h g p k Z m o k e h \ b j _ a h g Z [ 1 0 ] k Z

$$\lambda_0 = \frac{2}{\sqrt{m^2/h^2 + p^2/l^2 + q^2/b^2}}, \qquad (4)$$

] ^ _ $\lambda_0 = c/f$ ^ e b g \ Z h e g m , p , q q b k e h

D h w n n b p b h ] g e l h s _ g j b _ y a h g Z l h h j Z j _ ^ _ e y _ d l Z y h l g h r _ g i b h ] e h s Z _ k h l c - g d Z f b j _ a h g Z l f h h j Z g h k l d b i h ^ \ h ^ b f h h c \ h e g h \ h k ^ m Q f h s g h k l P_D^r / P_i . > e y a Z ^ - Z g g u o i h e h ' _ g b y j Z a f _ j h h \ l \ _ j k l k y \ y a b

g Z k l j h d i e h Z k d h i j b y f h m ] h e v j g _ h a l h g - Z l h j Z i j h b a \ h ^ b i h k y _ i f h ^ [ h j Z ] h j Z a f _ j h h \ b l l Z , d q l h [ u d h w n n b p b h _ g e l h s _ g j b y a h g Z l h j i Z b g b f Z g e Z b [ h e v a g Z q . g > b Z e _ _ h k m s _ k l \ e y l h l d k g y Z i y h ^ k l j h c d u Z [ h j h f i h e h ‘ _ g b d y d h j h l d h a Z f u d Z i k s j r g h y (j b . k 1). < d Z q _ k l \ b f _ j Z g Z j b . k 2 i j _ ^ k l Z \ e _ j g _ u a m e v l Z Z l k q _ w Z e _ d l j h f Z ] g b g h ] h i h e y \ j _ a h g Z l h k j h _ l \ _ j k l b _ k f y a b r b j b g h 0 . 8 a b k ] _ h f _ l j b q _ k p d _ b g f l j , h f k h \ i Z ^ Z x s k b p f _ g l j h k f l _ g l d j b _ a h g Z . l h j Z

< b ^ g ( h j b . k 2 Z , q l h \ g Z k l j h _ g j g _ h a f h g Z l h j k _ i Z j Z f _ l j Z f k b l k l _ h u = 51,6 f f ; l = 60 f f , ¤ l = 9,8 f f m d e Z ^ u \ , Z \ _ k l h k y l \ _ l k l \ b l k m k e h \ b j _ f a h g Z ( d ) k Z p _ e h q _ b k e h i h e m \ h m e g 3 g Z r b j b g h _ b p = 2 g Z ^ e b g _ l j _ a h g Z . l h ¬ j Z g _ g Z k l j h _ g j g _ h a f h g Z l h j _ (j b . k 2 [) k i Z j Z f _ l j Z n f ¤ 53,6 f f ; l = 60 f f , ¤ l = 9,8 f f i h e _ f Z e l h k j Z \ g _ g l b i x h e _ f k l h y q \ _ h c e g \ u \ h e g h \ . h ^ _

***Резонатор с керамическим образцом.*** < d Z q _ k l d l j b l _ j b g y Z k l j h c j d _ b a h g Z l h k j Z j Z a f _ s _ g g \ u g j _ f i h p _ g l j p m b e b g ^ j b q _ k d b f d _ j Z f b q _ k h d [ h j Z a p h u f [ b j Z _ l h k y k e h \ b _ f b g b f Z e v g h a k g l Z q _ g b y \ h ^ b f h c K < Q f h s g h k P b i j b n b d k b j h \ Z g b h k b i Z p b k b K < Q f h s g h k P b = 1 < l \ d _ j Z f b d _

l _ j _ g Z k l j h d m b ‘ v g Z k l j h _ g j g _ m a x d _ j Z f b q _ k d h [ h Z a p j Z a h g Z l h j g k m k l _ f m b a f _ g _ g b d _ e h ‘ _ g b d y j r g y g _ m ^ Z e h k v l h w l h f m m l j _ [ h \ Z e b k a f v _ g b \ w v k h l j m _ a h g Z l h ( h j Z = 55,6 f f ) b i h e h ‘ _ g b d j r g y ¤ l = 3,5 f f . L Z d h j c a h g Z l h ^ j Z e v g _ c r _ f j Z k k f Z l j b \ Z d Z k d y Z k l j h _ g g A u Z d _ i f h j r _ g v [ u e \ h a \ j Z s \ _ g h e h ‘ _ g b k _ h l \ _ l k l \ m x s _ i _ j \ h g Z q Z e g v Z g k h l c j h c j d a h g Z l h j Z [ _ a d _ j Z f b q _ k h d [ h j Z h a p Z = 9,8 f f . L Z d h c j _ a h g Z l h ^ j Z e v g _ c j r Z k k f Z l j b \ Z d Z k d y g _ g Z k l j h _ g D g Z u j d b g j Z k i j _ ^ _ e _ w g e b _ y d l j b q _ k d h h j e y \ g Z k l j h _ g b g b g f g Z k l j h _ g g h f j _ a h g Z l h j j Z b e e x k l j b j h g Z g b K 3.

***Стационарные тепловые состояния керамического образца в резонаторе.*** D Z d \ [ 3 6 ] i h e m q , _ g l h h \ k l Z p b h g Z j k g e h m f q b Z a Z h l g h k b l _ e [ v h g e h v r h c _ i e h i j h \ h ^ g h d k _ l b j Z f b q _ k d f h Z ] l h _ j b Z i e h Z e l _ _ f i _ j Z l m \ j d - _ j Z f b d k _ e Z [ g h _ h ^ g h j h ^ g h k f h l g y Z a Z f - _ l g m x g _ h ^ g h j h ^ g b h k l h v q g b d _ h i e h \ u ^ - _ e _ g b y (j b . k 4). I h w l h f m h _ i e h \ h k _ h k l h y g b _ h [ j Z a p i Z h e g o _ Z j Z d l _ j b a f m Z _ d l k k d y f Z e v g u f a g Z q _ g T $_{max}$ f l _ f i _ j Z l m j d u h l h j Z g y _ h ^ g h a g Z q g h h i j _ ^ _ e y _ a k Z y ^ Z g b i _ h f ^ \ h ^ b f h c K < Q f h s g h k P b f b d j h \ h e g h l b a ] e h m q . _ g b y l j b a Z ^ Z g \ b d b Z q _ k \ l g _ r g _ j w h e _ d l j h - ^ b g Z f b q _ k d h i Z h j Z f _ l j a Z Z ^ Z q b k k b i b j m _ \ f h c d _ j Z f b f d h _ s g h k j Z k k q b l Z k g \ Z h y d m i g h k l v k l Z p b h g Z j k g h u k d h y g l b e h k d h (k P$_i$, T$_{max}$) h [ j Z a m g _ l e b g _ c g a n Z x b k b f h T$_{max}$(P$_i$), b f _ x s m x o Z j Z d l _ j g S = h x [ j Z a g m m x h j f m (j b . k 5). < h i j _ ^ _ e _ g ^ g b n Z i Z a h d g Z _ ‘ ^ h f m a g Z q _ g h b × Q f h s g h k l k b h h l \ _ l k l \ m g × l k d h e v k d l Z p b h g Z j k g h u k d h y , g h b [ q i Z a m x s b o i h k e _ ^ h \ Z l _ e v q g _ j k ^ \ v m x s b f o _ k ^ y m k - h [ h c m k l h c q b ( \ g u Z D _ l \ y k d T$_{max}$ / d P$_i$ > 0) b g _ m k l h c q ( k d T$_{max}$ / d P$_i$ < 0) j _ r _ g b d y M k l - h c q b \ h k k v h k l h y g h b j c _ ^ _ e y _ b l a k v b a b q _ k d b o k h h [ j Z ‘ _ g i h c h l g h r _ g b d k n e m d l m Z p b y f l _ f i _ j Z l m j u

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J b . k 2. I h e _ f h ^ m e g y Z i j y ‘ _ g g h w k e b _ d l j b q _ i k h d e h y ] g h Z k l j h _ g ( g Z h f b g _ g Z k l j h _ ( g ) g j g _ h a f h g Z . l h j _

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J b. k 3. I h e _ f h ^ m e y Z i j y ' _ g g h w k e l b _ d l j b q _ i k h d e h y ] g h Z k l j h _ g ( Z h f
b g _ g Z k l j h _ ( d ) g j h _ f a h g Z l k h d j _ j Z f b q _ k h d [ b Z f a p h f



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J b. k 5. A Z \ b k b f h f Z k b v k b f Z e v l g f h c _ j Z l m p j b u e b g ^ j b q _ d k _ d h Z ] h b q _ k h d [ h j Z h a p Z
97% $Al_2O_3$ h l i h ^ \ h ^ b f f h h c s g h k ( 1 b ' g _ g Z k l j h _ j g _ a u h c g Z 2 h j g Z k l j h _ g j g _ u a c h g Z . l h j

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< b ^ g ( h j b . k 5 ) , q l h i Z j Z f _ l j j u _ a h g Z l h j g h c k b k l _ f b d Z a u \ Z \ x e l b y g b g _ Z a Z \ b - k b f h k l v f Z d k b f Z e v l g _ h f i c _ j Z l m j k u l Z p b h - g Z j g u o k h k l h y g h b l c i h ^ \ h ^ b f h f b s g h k , l b g h d Z q _ k l \ _ g \ g b u r ^ c d j b \ h c \ j Z k k f h l j _ g g u o k e m q Z g y b o a f _ g y . _ M k o y Z k l d h j d b \ h 1 c \ l _ f i _ j Z l m j g h b g f l _ j \ Z 4 5 0 – 1 1 5 0 " K b ^ b Z i Z a h g _ i h ^ \ h ^ b f h f b s g h k 1 0 0 0 – 1 1 0 0 < l – w l h g _ - m k l h c q b \ Z h y g h k b l _ e l v _ g f h _ j Z l m j g n u e o - m d l m Z p b c l \ v a Z \ b k b f h f k Z l d k b f Z e v l g _ h f i c i _ j Z l m j u l i h ^ \ h ^ b f h f b s g h k l b F Z d - k b f Z e v g l Z _ y f i _ j Z l m g j Z w l h f m q Z k g d f h ' _ l [ u l v h ^ g h a g Z h q i g j h ^ _ e _ a g Z Z ^ Z g b i h f \ - h ^ b f h c f h s g h k l b K b a f _ g _ g b i h e h ' _ g b y i h j r g y d - ( j b k 5 d j b \ Z ) y l _ f i _ j Z l m j g j u Z _ g b p u g _ m k l h c q \ b _ \ l h \ b a f _ g b e g b k a r g - Z q b l _ e v g ( 4 5 0 – 1 0 0 0 " K ) , Z i h i h ^ \ h ^ b f h f b s g - h k l b \ _ j o g y ] j y Z g b p ^ Z b Z i Z a h m g f Z _ g v r b e k Z k v 1 1 0 0 ^ h 2 0 0 < l G Z e b q g b _ m k l h c q \ b _ \ h \ b j Z k k f Z l j b \ Z _ a f Z l c b k b f h k l h ' b _ l i j b \ - h ^ b l v d g _ d h g l j h e b j m m f \ h f e m b q _ g _ b f i k - _ j Z l m j \ u a h g Z l b o ] e h s _ g k b < y Q b a e m q , _ b g b y a g Z q b l _ e n v k g e h h ' g y m _ i l j Z \ e _ g f b b d j h \ - h e g h \ u f g Z ] j _ \ b d f _ j Z f b d b

I j h \ _ ^ _ g g j u Z c k q _ k l b k l _ f f u b d j h \ - h e g h \ h ] g h Z ] j _ , \ k Z h k l h y s b _ a c j y f h m ] h e v g h ] h j _ a h g Z l k h j Z j Z a p d h f _ j Z f b d b d b h ^ \ h ^ y - s _ ] h w g _ j ] b w x e _ d l j h f Z ] g b i h g e h y ] h e g h \ h ^ Z k d h j h l d h a Z f u d Z i x h s j b g j _ , f g Z h k g h \ _ ^ \ m f _ j g u m o j Z \ g _ g j Z b e Z g w k g Z _ j ] b b j b - \ _ ^ _ g g h m ] h e g h \ h m j h Z \ g _ i g h b ^ y l \ _ j ' ^ Z _ l j _ a m e v , l Z h e m q _ g \ g 4 u j _ i j b j _ r _ g b h b ^ g h f _ j g h a c Z ^ Z g g Z ] j _ \ d Z _ j Z f b q _ k d f ] h j Z a p \ Z p b e b g ^ j b q _ j k d a l h f g Z . l k - b _ ^ a Z - \ b k b f h k l h b Z d k b f Z e v l g _ h f i c _ j Z l m j k u l Z p - b h g Z j g u o k h k l h y g h b l c j Z a p h Z l i h ^ \ h ^ b f h c f h s g h k l b b f _ _ l o Z j Z d l _ j g S m h x [ j Z a g m x n h j f . m l h e _ l _ f i _ j Z l m j \ u d _ j Z f b d e Z [ h g _ h ^ g h j . h H g h e Z k b d g l _ g k b \ g h j ] e h - \ u ^ _ e _ g b d f y _ x l j Z a f _ j [ u e b a d d b ^ _ e b g \ h - e g u K < Q h e y d _ j Z f b q _ k h d [ h Z a p _

< j Z k k f h l j _ g k g b h k c l _ f f b _ d j h \ h e g h \ h ] h g Z ] j _ \ Z b ^ a Z \ b k b f h f k Z l d k b f Z e v l g _ h f i c i _ j Z l m j h u l i h ^ \ h ^ b f f h f b s g h k l k b b a f _ - g _ g b _ f h e h ' _ g d b y j h l d h a Z f u d Z i x h s j r - ] h g y d Z q _ k l \ _ g g l g u a f _ g y . _ l k y

***Литература***