



2021 .  
(III )

11 .

1. .
2. , .
3. !
3. .
4. , , .
5. , , .



- : (1 .);
- 3 (6 .);

11.1.

- « ».

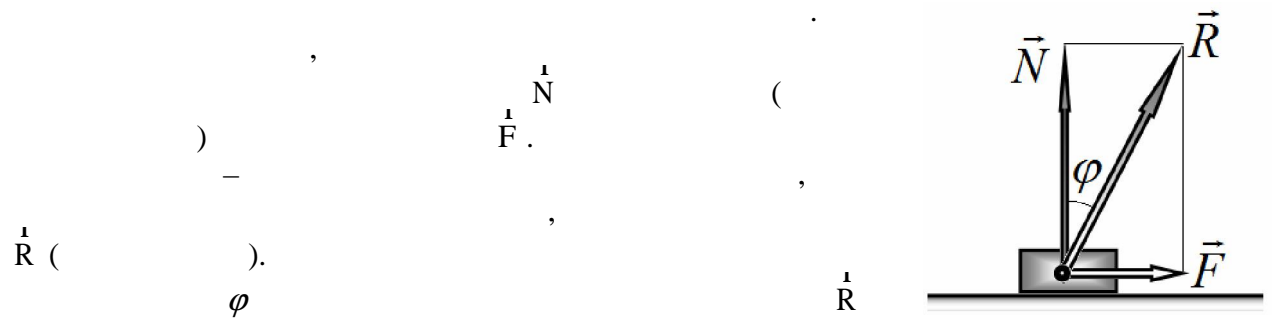
,

,

.

$\mu$

1.

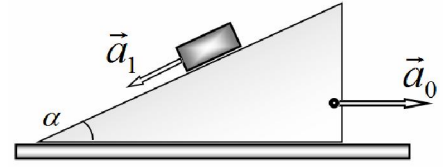


1.1	$\mu$	$\varphi$ .	$\vec{N}$
1.2	$\vec{R}$		$\vec{N}$
	$\varphi$ .		

1.3	$\vec{R}$	$mg$ ,
1.4	$\alpha_0$	$\varphi$ .
$\vec{R}$ ?	?	
1.5	,	$\alpha$ ( $\alpha > \alpha_0$ ).
	?	$\alpha$ $\varphi$ .

2.

,  $\alpha$  .  
 $\vec{a}_0$ , .



2.1 , ,  $\vec{g}'$  ( ,  $\vec{g}'$   $\vec{g}'$  .

2.2 ,  $\beta$  ,  $\alpha'$  .  
 $\alpha$  ,  $\vec{a}_0$  ,  $\vec{g}$  .

2.3  $\alpha$   $\alpha_0$  ( .1.4).  
 $\alpha, \beta, \varphi$  ,  $\vec{a}_0$  ,  
 ( . . ) .

11-2.

$\Omega$  —  $\Omega$  — ( )  
 ( , , ) .

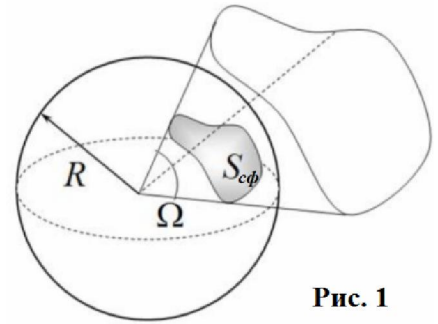


Рис. 1 ( ) .

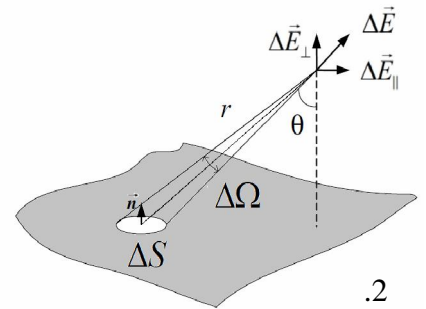
$\Omega = 1$

$4\pi$  (  $R^2$  ),

1. « »

1.1 , « »  
 ( .2)  

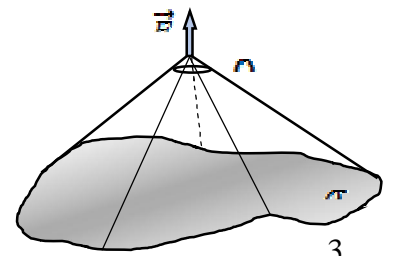
$$\Delta\Omega = \frac{\Delta S \cos\theta}{r^2}$$
 $\theta$  —  
 $\hat{n}$



.2

1.2 , ( .3),  

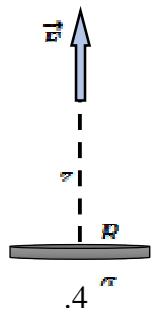
$$E_\perp = \frac{\sigma\Omega}{4\pi\epsilon_0}$$
 $\sigma$  — ,  $\Omega$  —



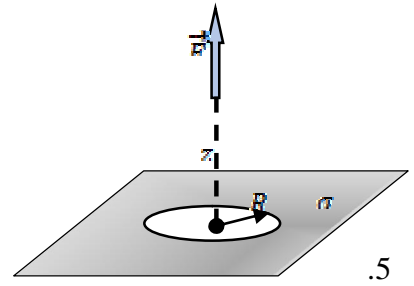
.3

1.3 E,  
 $\sigma$  .

1.4  
 ( . 4)  
 $z \gg R$        $z \ll R$   
 $E(z)$   
 $\sigma$



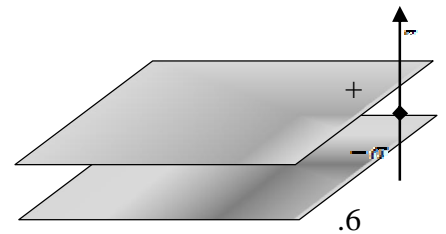
1.5  
 R ( . 5).  
 $E(z)$   
 $z$   
 $z \gg R$   
 $z \ll R$



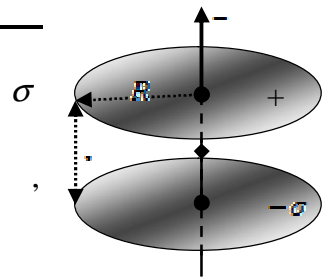
1.6  
 Q      m  
 $z$

2.

2.1.  
 $E(z)$   
 $\sigma$



2.2.  
 $E(z)$   
 $z \gg R$



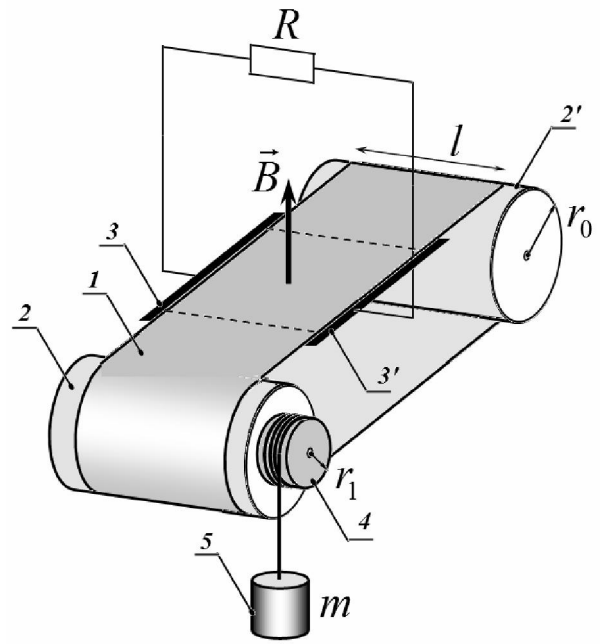
2.3.  
 $z = 0$   
 2.2,      )  $R = h$ ;      )  $R = 10h$ ;      )  $R = 100h$ .

;  
 ;       $\Omega = 2\pi(1 - \cos\alpha)$        $\alpha$

11-3.

1.

1 2 1 2',  
 r<sub>0</sub>.  
 3 3'.  
 (  $\vec{B}$  ),  
 R.  
 4 r<sub>1</sub>.  
 5 m.  
 g.



(m, R, B, r<sub>0</sub>, r<sub>1</sub>, g).

1.1 , ( ) ,

1.2 :

1.2.1 v<sub>0</sub> v;

1.2.2 ε I ;

1.2.3 P, ;

1.2.4 η ( , ).

2.

R

$\epsilon_0$ ,

R.

2.1 , .

2.2 , .

2.3 :

2.3.1  $\epsilon_{0min}$  ,

( ,  $\epsilon_0 > \epsilon_{0min}$  );

2.3.2 I ;

2.3.3 v ;

2.3.4 P , ;

2.3.5  $\eta$  ( , );