SUN ELEMENTS ON THE SURFACE HARVEST DONE TEXTURES AND OPTICAL LAYERS MATHEMATICIAN FROM METHODS USING RESEARCH TO DO

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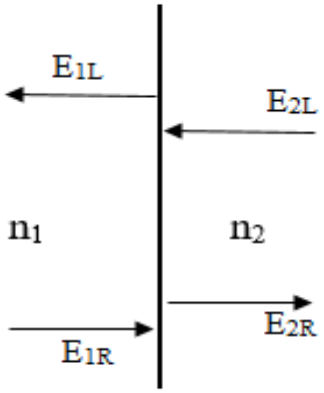
Annotation: *Anti- reflective layered sun elements return, absorption and transition coefficients theoretical analysis We will do it . The light environment within the border events mainly fresnel laws through is determined. But at the border it's not one how many in the layer What if? In that case how is determined? for we matrix transfer matrix from the style we use.*

Key words: *Electricity field, matrix, electromagnetic wave, falling light, returning light, passing by leaving rays, fresnel.*

Home part:



Here:

E_{1R} , E_{2R} – right towards directed electricity field are strengthened . E_{1L} , E_{2R} – to the left directed electricity field their strength .

To the surface entering electricity field their strength through from the outside those who are leaving we express .

$$\begin{cases} E_{2R} = t_{1,2}E_{1R} + r_{2,1}E_{2L} \\ E_{1L} = r_{1,2}E_{1R} + t_{2,1}E_{2L} \end{cases} \quad (1)$$

$t_{1,2}$ and $r_{1.2}$ – refraction from medium 1 to medium 2 and return coefficients .

$t_{2,1}$ and $r_{2.1}$ – refraction from medium 1 to medium 2 and return

These fennel formulas through define We will get them . They between The bond is given in formula 2 and 3. The length of the wave to nature according to electricity and magnet of the fields perpendicular on the plain vibrates and they one to one relatively This is a class phase . their equal entitlement means . Light in the environment properties determination for us mainly electricity field from being strengthened we use .

$$r_{1,2} = -r_{2,1} \quad (2)$$

$$r_{1,2}^2 + t_{1,2}t_{2,1} = 1 \quad (3)$$

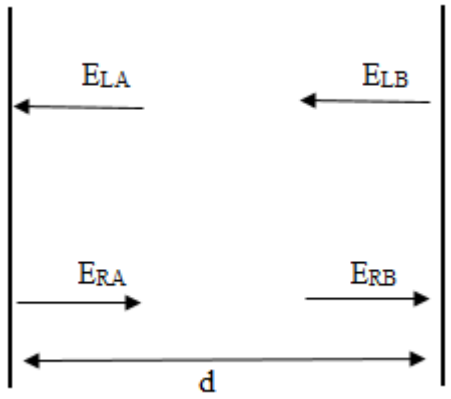
Now, add formulas 2 and 3 to formula 1. Let's say environment 1 and 2 between connection harvest will be .

$$\begin{cases} E_{1R} = \dfrac{1}{t_{1,2}}E_{2R} + \dfrac{r_{1,2}}{t_{1,2}}E_{2L} \\ E_{1L} = \dfrac{r_{1,2}}{t_{1,2}}E_{2R} + \dfrac{1}{t_{1,2}}E_{2L} \end{cases} \quad (4)$$

$$\begin{bmatrix} E_{1R} \\ E_{1L} \end{bmatrix} = \frac{1}{t_{1,2}}\begin{pmatrix} 1 & r_{1,2} \\ r_{1,2} & 1 \end{pmatrix}\begin{bmatrix} E_{2R} \\ E_{2L} \end{bmatrix} \quad (5)$$

$$D_{1,2} \equiv \frac{1}{t_{1,2}} \begin{pmatrix} 1 & r_{1,2} \\ r_{1,2} & 1 \end{pmatrix} \quad (6)$$

D $_{1\ ,2}$ is called the “transmission” matrix . This matrix through two environment within the border electricity field that they are strengthened change express we will get



The environment inside electromagnetic wave absorption We know that the environment one on the edge electricity field strength with second on the edge electricity field strength between connection find we get [1].

$$\begin{cases} E_{RA} = e^{ikd} E_{RB} \\ E_{LA} = e^{-ikd} E_{LB} \end{cases} \quad (7)$$

$$\begin{bmatrix} E_{RA} \\ E_{LA} \end{bmatrix} = \begin{pmatrix} e^{ikd} & 0 \\ 0 & e^{-ikd} \end{pmatrix} \begin{bmatrix} E_{RB} \\ E_{LB} \end{bmatrix} \quad (8)$$

$$P \equiv \begin{pmatrix} e^{ikd} & 0 \\ 0 & e^{-ikd} \end{pmatrix} \quad (9)$$

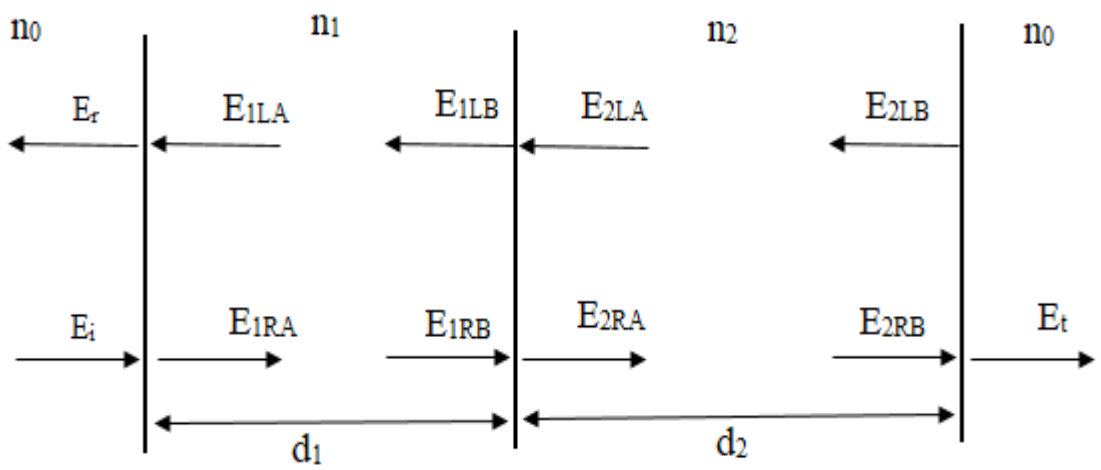
P is called the “ propagation ” matrix , and this of light in the environment absorption represents .

d- environment thickness .

k- in the environment light wave number .

i is an abstract number.

We are matrices from the style using 2 layers system return , absorption and transition coefficients Let's find it .



Matrices style user if we are

$$\begin{bmatrix} E_i \\ E_r \end{bmatrix} = D_{0,1} \begin{bmatrix} E_{1RA} \\ E_{1LA} \end{bmatrix} \quad (10)$$

$$\begin{bmatrix} E_{1RA} \\ E_{1LA} \end{bmatrix} = P_1 \begin{bmatrix} E_{1RB} \\ E_{1LB} \end{bmatrix} \quad (11)$$

$$\begin{bmatrix} E_{1RA} \\ E_{1LA} \end{bmatrix} = D_{1,2} \begin{bmatrix} E_{2RA} \\ E_{2LA} \end{bmatrix} \quad (12)$$

$$\begin{bmatrix} E_{2RA} \\ E_{2LA} \end{bmatrix} = P_2 \begin{bmatrix} E_{2RB} \\ E_{2LB} \end{bmatrix} \quad (13)$$

$$\begin{bmatrix} E_{2RA} \\ E_{2LA} \end{bmatrix} = D_{2,3} \begin{bmatrix} E_t \\ 0 \end{bmatrix} \quad (14)$$

Here :

E_i – to the surface falling light

E_r – from the surface returning light

E_t – from the body passing by leaving light

Above expressions one after another with seat place putting if we go out falling light , returning light and passing by leaving rays between connection we will get

$$\begin{bmatrix} E_i \\ E_r \end{bmatrix} = D_{0,1}P_1D_{1,2}P_2D_{2,3}\begin{bmatrix} E_t \\ 0 \end{bmatrix} \quad (15)$$

$$M \equiv D_{0,1}P_1D_{1,2}P_2D_{2,3} \quad (16)$$

$$M = \begin{pmatrix} m_{11} & m_{12} \\ m_{21} & m_{22} \end{pmatrix} \quad (17)$$

M – “ transfer ” matrix It is called .

We know that light light two kind screen to the plain parallel and perpendicular to the rays We are separated from the above expressions general in case brought we have extracted if parallel or perpendicular polarized rays for wants to count If , then r and t instead of suitable fresnel formulas we use .

$$r_{um} = \frac{m_{21}}{m_{11}} \quad (18)$$

$$t_{um} = \frac{1}{m_{11}} \quad (19)$$

Returning leaving rays amount reduction again one style , sun element on the surface the pyramids harvest is to do . Flat to the surface fallen light only one once breaks . This is the light less to be swallowed reason If the surface texture that is pyramids with if we cover on the surface the light more once to break we will achieve . Harvest being done of the pyramids based on to the corner looking at falling of light how many once fracture define we get . And this through sun element exactly how pyramids with coverage necessary knowing If the pyramids between light four once imagine it breaking if we do every one fracture corners and pyramid based on corner between The bond is

given in formula 20. This according to pyramid based on corner how in between to be necessary define we get . So of the pyramids based on angle 64.3<α< 80 to be need .

$$\begin{aligned} a_1 &= a \\ a_2 &= 3a - \pi \\ a_3 &= 5a - 2\pi \\ a_4 &= 3\pi - 7a \end{aligned} \quad (20)$$

Here α is the pyramid based on corner

$$a = \arctan\left(\frac{2h}{d}\right) \quad (21)$$

Here h is the pyramid. height , d – pyramid base width .

If every one in the break return coefficients pyramid based on to the corner related function if we say , then general return coefficient as given in formula 19 every one broken return coefficients to the product equal

$$R(a) = r_1(a_1)r_2(a_2)r_3(a_3)r_4(a_4) \quad (22)$$

Here : r $_1$ (a), r $_2$ (a), r $_3$ (a), r $_4$ (a) is a pyramid based on to the corner related was return coefficients . They fresnel from formulas find we will get

$$r_k(a_k) = \frac{n_1\cos(a_k) - n_2\cos(\gamma_k)}{n_1\cos(a_k) + n_2\cos(\gamma_k)} \quad (23)$$

General return coefficient pyramid based on corner function that into account if we take , then this function pyramid based on corner according to derivative take to zero If we equate then the function extremum point find we will get

$$r_1(\alpha)r_2(\alpha)r_3(\alpha)\frac{dr_4(\alpha)}{d\alpha} + r_1(\alpha)r_2(\alpha)r_4(\alpha)\frac{dr_3(\alpha)}{d\alpha} + r_1(\alpha)r_3(\alpha)r_4(\alpha)\frac{dr_2(\alpha)}{d\alpha} + r_4(\alpha)r_2(\alpha)r_3(\alpha)\frac{dr_1(\alpha)}{d\alpha} = 0$$

(24)

Conclusion: Analytical solution of equation 24 above when calculated, the pyramid based on angle α=73.12 ^{0} to be need known it has been [1;2] Above

calculated of the results all perpendicular polarized light If we have parallel polarized from the light want to use If we are , then it is also obtained pyramid based on corner value unchanging become It will remain . So , the sun elements optical features improve for being done affairs all of them classic physics theories with understand we get . This is to us new technician solutions thinking to find help gives .

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