

Reflection coefficient from a semi-infinite structure in the discrete emitter array

(Dated: January 15, 2024)

We consider an excitation propagating in the semi-infinite array of emitters. The amplitude of the excitation satisfies the equation:

$$-i\gamma_{1D} \sum_{n=1}^{\infty} e^{i\varphi|m-n|} \psi_n = \omega \psi_m, \quad m = 1, 2, \dots \quad (1)$$

Goal: prove that that solution of Eqs. (1) can be presented in the form

$$\psi_m = e^{-iK(m-1)} + r e^{iK(m-1)} \quad (2)$$

where K is the polariton wave vector at the frequency ω and r is the reflection coefficient of the polariton from the internal boundary the structure. Find the reflection coefficient r .

Hint:¹

¹ M. Voronov, E. Ivchenko, M. Erementchouk, L. Deych, and A. Lisyansky, *J. of Luminescence* **125**, 112 (2007).