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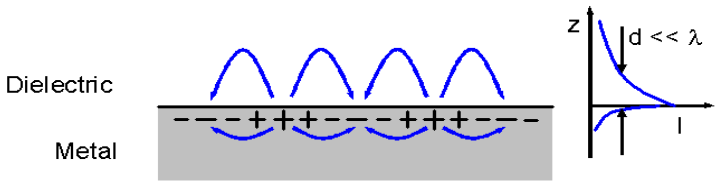
Evanescent Waves



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From Wikipedia:

An evanescent wave is a near-field wave with an intensity that exhibits exponential decay without absorption as a function of the distance from the boundary at which the wave was formed. Evanescent waves are a general property of wave-equations, and can in principle occur in any context to which a wave-equation applies.

As usual, that is false. Although we will see that this *is* a phenomenon that takes place in the near field, one problem the mainstream has is in its definition of the near field. We are told the near field is very near currents and charge separations, but from my theory of charge channeling, we now know that the near field is the field near the nucleus (or ion). It is "near" because the charge channeling out of the ion or nucleus has not dissipated due to distance yet. Therefore, the near field is mainly defined by charge density, not by the current interpretation of the wavefunction. We could say it is defined by Schrodinger's *old* definition of the wavefunction—which was based on charge density—but since the mainstream never accepted that definition, the mainstream is lost here from the first word. When they say an evanescent wave is "a general property of wave-equations," they are diverting you into "quantum mechanical" explanations which dodge mechanics entirely.

We have proof of that already, since they tell you that a wave can exhibit exponential decay without absorption. The problem is that they are proposing an exponential decay without *a physical cause*. Experiments seem (to them) to indicate exponential decay, so they propose it without providing you with any cause. In fact, all logic (and thousands of other experiments) would indicate that light cannot exhibit exponential decay unless it enters a field that increases exponentially, but that is not the claim here. If you follow the "theory" closely, they never claim an exponential decay due to a field response (or even due to spherical radiation). They claim an exponential decay because it is the only mathematical solution they have to their equations, given their old assumptions:

We therefore conclude that the transmitted wave must be a non-vanishing solution to Maxwell's equations that is not a traveling wave, and the only such solutions in a dielectric are those that decay exponentially: evanescent waves.

But, as I will show below, you only need that mathematical solution when you fail to define your fields properly and fail to define your problem properly. If you define your fields properly and understand

what is happening on a mechanical level, the solution here is simple. There are no evanescent waves, no exponential decay of those waves, and therefore no need to push the old equations.

Before we get to that solution, I want to point out ways you should have known the current solution could not have been right, even before I got here. Let's look at the biggest fudge in the math, for starters. We are told,

Mathematically, evanescent waves can be characterized by a wave vector where one or more of the vector's components has an imaginary value. Because the vector has imaginary components, it may have a magnitude that is less than its real components. If the angle of incidence exceeds the critical angle, then the wave vector of the transmitted wave has the form

$\mathbf{k} = k_y\mathbf{y} + k_x\mathbf{x} = i\alpha\mathbf{y} + \beta\mathbf{x}$

which represents an evanescent wave because the y component is imaginary. (Here α and β are real and i represents the imaginary unit.)

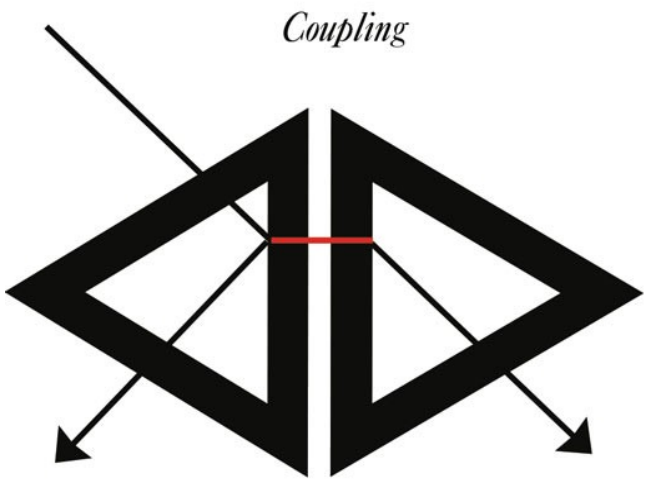
That's a big fudge because 1) we have no indication from data that light has any imaginary sub-vector, 2) imaginary components don't imply smaller magnitudes, 3) I can explain this simply without imaginary vectors (see below). These "mathematicians" are just assuming you don't know anything about imaginary numbers, or their use in E/M field equations. They are assuming you will bite on this "it may have a magnitude less than its real exponents" dodge. But if you read my paper on imaginary numbers or study them in-depth yourself, you find that there is nothing imaginary about them at all. Historically, the square root of negative one was used only to insert more degrees of freedom into the equations, to make them match the degrees of freedom found in E/M field equations like Maxwell's equations. But we are not in an imaginary field here at all, much less a negative field. Rigorously, we aren't even talking about the square root of negative one, as in pure math. We are talking about the square root of the ordered pair (-1,0). In the E/M field, neither i nor i^2 is negative in any way: the negative only indicates polarity. But it does not indicate "a smaller magnitude", a virtual field, or anything along those lines.

They should know this, and in fact they *do* know this, since we can put any sort of field meter (electrical, magnetic) in the near field they are talking about. We can measure the field in the gap we will find in this experiment, or we could just measure the field beyond *any* total internal reflection surface. We know empirically that the light field is not exponentially decaying in any physical way whatsoever. It is either being reflected or it isn't. We have a field boundary here, so we will find a *charge* field transition, but we can manipulate that field transition to any extent we like, either by current or pressure through that gap; so it makes no sense to talk about an exponential decay. In most cases (where we have no substance beyond the substance that is reflecting), we will have a finite fall in charge density. But in the experiments that led to evanescent waves, we find pressure creating a *greater charge density*. In that case, we not only find no exponential decay, we find an increase.

You also have to differentiate between the light and the evanescent wave. They are telling you the evanescent wave shows an exponential decay, but what happened to the original light? Did they ditch it? Did they replace it with the evanescent ray? Did one create the other? What happened? What happened is they ditched the photon and the light completely, replaced it with the evanescent wave in the gap, and then let the evanescent ray replace the near field charge as well. You see, we wouldn't expect the light to show exponential decay, but we would expect the charge to show limited exponential decay (provided the first prism was emitting into an empty field). But since they don't want to talk

about charge being radiated into the gap, they replace *both* the light and the charge with the evanescent wave, which they can manipulate any way they like. Neither light nor charge are strictly E/M waves—I have shown they are strictly sub-E/M waves caused by real spinning particles—but the mainstream theorists misdirect you into E/M because neither charge nor photons give them any field theory. You can't get any mechanics from massless, sizeless particles with no real spin, so the best they can hope to do here is propose a virtual wave that they can push any way they like. Fearing even that virtual wave wouldn't be enough to misdirect you, they bring in an imaginary vector field as well.

But let us look at the actual experiment, to see what else these encyclopedia entries are hiding from you. Evanescent waves were proposed to explain the "coupling" of two "optical waveguides." What are optical waveguides? In the most common experiments, they are simply something like prisms. Say you put two prisms face to face and pass a beam through at a given angle. At that given angle, you would find total internal reflection, and no light would pass through the gap into the second prism. But if the two prisms are brought very close together (without touching), at a certain distance you find "coupling,"—which just means you find light on the same angle now passing the gap and moving on through:



Given current theory, you can see why this might appear mysterious, and require extreme measures for solution. But given my charge theory, you don't need any of that. Once we recognize the reality of the charge field, we remember two things: 1) both prisms will not only contain a real charge field, they will emit it, 2) even prior to this emission, there was charge in the ambient field. This experiment is not done in vacuum, obviously, since we are given two large real objects—which are admitted to be "electromagnetic elements." "Electromagnetic elements" are charge emitters. All objects are charge emitters, but since they admit these objects are "electromagnetic elements," both they and you should know that the charge field is heavy here. You can call it blackbody radiation or charge, but it is the same thing either way. You can't have a vacuum where you have large "electromagnetic" objects, since even if you had a vacuum before inserting the objects, they will immediately pollute the space with new charge. So we have charge in the gap regardless.

Now, if we bring the prisms together, we bring not only the bodies of the prisms together, we bring

their charge fields together. We also compress the charge field in the gap. If the charge emission from the surfaces is constant and the ambient field is constant, a smaller gap necessarily indicates more charge pressure and a higher charge density. What causes coupling is simply a combined or integrated charge density that exceeds the charge density of either object alone. In other words, the charge density in the gap actually becomes greater than the charge density on the surface of either prism.

How can that be? It happens because you have brought the near field of one prism into the near field of the other. The surfaces are so close together that the atomic or molecular charge field hasn't even had time to dissipate. If the fields are stacked that way, you have to integrate them. The mainstream admits that coupling is strongest within 1/3 of a wavelength from the object, so they know this, in a way. And their explanation matches mine here in many ways:

The evanescent wave coupling takes place in the non-radiative field near each medium and as such is always associated with matter; i.e., with the induced currents and charges within a partially reflecting surface. This coupling is directly analogous to the coupling between the primary and secondary coils of a transformer, or between the two plates of a capacitor.

Notice they say what I say here: the near field is associated with matter. They also link this effect to effects in transformers and capacitors, which is right. However, they say that this "coupling takes place in the non-radiative field near each medium." Why would they say that? Why "non-radiative?" Only because they don't wish to use real charge to solve this. That would ruin their various maths and theories, and simplify this problem so much that people would lose their jobs. If you let charge be a real radiated field, you destroy the strong force, symmetry breaking, the quark models, virtual particles, and a thousand other things. So although real radiated charge is the natural and logical assumption here, they won't let you go there.

We see that in the subtext to the first illustration at Wikipedia (which I have borrowed under title), which says

The charge density oscillations, when associated with electromagnetic fields, are called surface plasmon-polariton waves.

Once you have charge as a real emission field (or recycled and channeled field), you don't need plasmons or polaritons either, so all the guys coining these idiotic terms have to find something else to do.

Now, if we have a boosted charge field in the gap—due to integrating the charge fields of the two prisms—this will act to open up the atomic or molecular spacing on these two surfaces. If you change the spacing, you have changed the angle of reflection. The photon can now get through!

Think of the reflection surface of the prism as a dashed line, where the black part of the line indicates a real atom or molecule. In reality, what causes the photon to be reflected is neither the atom, the nucleus, or the molecule, but it hardly matters here. What causes the reflection at the quantum level is the effective width of the charge field emitted by the nucleus or molecule residing there, but since I have covered that elsewhere, we can let it pass. All that matters is that we assign some spacing here, and assign the cause of that spacing to the particular composition of the matter present. The white between dashes then becomes space through which the photon may pass. Even there we find charge, but it is charge with a density or direction that cannot turn our light photons.

If we have total reflection, it just means none of our photons can get through those gaps. The photon with all its spins is simply too large to pass. Although the mainstream thinks the photon has no width, and although even my photon has a central radius of something like 10^{-24}m, the photon often acts like a much larger particle, due to its linear speed and spin speed. To compute its effective size in experiments like this, we have to scale up by c^2, as I have done in many previous papers. This physically and mathematically allows us to import both the linear speed c and the spin speed c into the field size of the photon. And yes, this means that the individual photon expresses the wavelength, not the wavefront or a collection of photons. *One photon*. We should have known that, since one visible photon can have a magnificently large energy, one on the order of 3eV. At STP, that is around ten times more energy than we currently give to a gas molecule.

As you know, for all practical purposes my theory dovetails with classical theory, and classical theory in optics is still the current mechanical theory beneath quantum theory—although it is now used only as a fallback position. Reflection and refraction are (roughly) caused by wavelengths in this way in classical theory, except that of course they assign the wavelength to a wavefront, not a single photon. A wavelength is a real size in the field, and in classical theory this wavelength interacts physically with some structure in the field. So my theory is only a tweaking of and extension to classical theory. We give the wavelength to one photon, scaling that length up from the real radius of the photon. We then monitor how the angle of incidence affects the width of the gap in the medium.

What I mean by that is we notice that any gap will look smaller from an angle. Not only will it *look* smaller, it will act smaller. Take a pencil and look at it right in front of you. It has an apparent width that pretty much matches its real width. Now move that pencil two feet to one side of you, and look at it out of the corner of your eye. It is now already almost half the apparent width it was before, and that loss of apparent width is caused only by the angle. It is called perspective. Well, if instead of a pencil, you make your pencil a gap, the same thing will happen: as you increase the angle you decrease the apparent width of your gap. And if you had to go through that gap at that angle, it would not only appear smaller, it would act smaller. If you could get through the gap in front of you, you couldn't get through the gap at the angle. *This is what is happening with light*.

The photon can't get through the gap it could get through before, because the angle of incidence has made the gap smaller. Nothing has changed in the material, only the angle has changed. The gap isn't really smaller, it just has a smaller effective entry. If you play pool, you know all about that. It is much easier to play a ball into a pocket if you are at no angle. If you come at it from an angle, the amount of pocket open to the ball has shrunk.

You probably know all that, but if you don't, let it sink in before you continue. Go play a game of pocket billiards and let the information go to your brain through your hands.

Now, once we have that in hand, we can look how the boosted charge field in the gap affects the outcome. If we have an increase in charge density in the gap, what that means is that we have more charge photons hitting everything in the area. This will cause an increase in charge pressure, which will cause all gaps to increase. This is why heat tends to liquefy solids and turn liquids to gas. It increases gaps. So the same light on the same angle that couldn't pass before can now pass. It travels into the gap and proceeds on to the other prism.

But we still have two problems to solve. Why does the light flatten out its angle in the gap, and why does it return to the old angle in the second prism? I hope you can see the answer is no longer difficult. The light flattens out in the gap simply because the charge field in the gap doesn't have the same

structure as the charge field in the prisms. The prisms don't exist in the gap, so their molecular structure doesn't determine the field structure. What does? The integrated charge field of the two prisms, minus the molecular field. We have no molecular field in the gap, but we have an integrated charge field that is stronger than either prism field. Since the prisms are affecting one another face to face—*not* on any angle—this integration must physically and mathematically occur on a straight line between them. In the absence of molecules in the gap, the light cannot help but follow the charge field lines. Since light is charge and charge is light, the light cannot help but follow its own stream. The only way it would *not* follow that stream is if the light were very much more energetic than the charge field in the gap. But since we are following visible light in a boosted charge field stream, and since charge peaks in the infrared (which is just below visible), the boosted infrared field will trump the energy of the visible light, turning it.

You will say, "Then why didn't the entry face of the prism turn the light? Isn't the charge field in the prism stronger than the incoming light?" Yes it is, and normally it *will* turn it. To get this angle of reflection at the far surface requires aiming the incoming light and allowing for the turn at the first face. Either that or aiming the incoming light so that it takes the path the prism wants it to take to start.

Now, what about the turn at the second prism, where the light returns to the original angle? That is due to two things: 1) the second prism has the same structure and spacing as the first prism, 2) the second prism will have an increased spacing only at its forward surface. Once you get past the integrated field, the second prism will "cool off," returning us to the characteristics of the first prism.

You will say, "Yes, but what about the angle of entry? It can't be the same, can it? In this case, the light must enter perpendicular to the second surface. Did it enter perpendicular to the first surface?"

Actually, the angles do work out in this way, and this is known. This return to the original angle has nothing to do with evanescent wave theory or my theory, and it can be done with the old classical equations and logical postulates, so I do not need to rerun them for you. The charge field helps us understand why the angle is the same, but it doesn't change the classical math. The angle has to do only with the relative position of the two prisms, and it will *not* work if the prisms are different sizes or different compositions. Coupling may occur in that case, but the angle will change.

Why is any of this important? Doesn't the mainstream get a lot of this right? Don't they theorize near fields caused by the presence of matter? Don't they get the right answers at the end, numerically? Yes, but we have seen they get a lot wrong. To explain near-field integration mechanically, you have to have a radiated charge field. If you don't, your exponential "decay" takes place in a vacuum. If you do, your exponential decay is just the decay of your spherical charge field, not of some manufactured evanescent wave. Remember, the mainstream explanation is that,

In optics, evanescent-wave coupling is a process by which electromagnetic waves are transmitted from one medium to another by means of the evanescent, exponentially decaying electromagnetic field.

See, no real charge field there at all. They aren't letting the charge field "decay" into the gap, because they are telling you that matter is not radiating any field. As usual, they are assigning this to "electromagnetic waves" in an "electromagnetic field." But they are failing to distinguish between photons and ions, or the charge field and the E/M field.

The thing is, we don't need ions in the gap here, and they know that. This is a photonic effect all the way, with light traveling through a charge gap, so all this talk of the electromagnetic field is just

confusion or misdirection. Rigorously, this is not the E/M field, it is Maxwell's displacement field. We can solve without E, M, B, or H here. All we need is D, as I have shown. That means that charge must be in the gap, and that matter here must be radiating charge into the gap. That is the only way to explain any of this mechanically.

In short, what the mainstream does is jettison both the charge field and the light ray in the gap, replacing them with the evanescent ray, which they then back-engineer to fit math and data. As usual, they jettison what we know is there and replace it with some abstract idea that we have no possible data for. As we saw recently in the Drude-Sommerfeld model of electron transfer, they throw out everything real and replace it with virtual particles in a virtual field. And they do this not only because they cannot solve it with simple mechanics but because they wish to keep the virtual fields, for which a lot of top guys have won Nobel Prizes. If the mainstream admitted the charge field is a real field of real particles, the Royal Swedish Academy of Sciences would crumble and fall into the Baltic Sea.

Another problem is the way they desperately try to link this to tunneling, although nothing is tunneling through anything here, and I have to think they know that. To this day, they need to link real experiments to tunneling in order to give some ballast to the idea, and thereby to quantum mechanics as a whole, but there has never been an experiment that indicated tunneling in any way. Every experiment over eight decades that they have offered as an indication of tunneling indicated tunneling about as strongly as this experiment: which is to say not at all. Tunneling has been the fudge you have been sold as the solution, but it never made any physical sense from the time of Bohr. It should have been clear way back then that particles going places the equations could not put them was indication the equations were wrong, and needed to be fixed. But rather than do that, the old guys just pushed them in these hamhanded ways, jettisoning the particles and fields we knew were there and replacing them with manufactured particles, fields and math.

They say that these newer experiments with evanescent waves are equivalent to tunneling, “except with E/M waves doing the tunneling instead of quantum-mechanical wavefunctions.” But even this sentence of theirs betrays their disconnection from real physics. Notice they have two non-physical things tunneling. In the second instance they have math doing the tunneling. The wavefunction is a piece of math. Are they really suggesting that a piece of math is tunneling? In the first instance, they are suggesting that a wave is tunneling. Well, a wave is not just math, but it *is* just a shape on a background, by definition. How is that shape tunneling? Shouldn't the wave have to be created by something real, like a photon or electron? In which case they should say a photon or electron is tunneling. They don't say that. Why not? Because they can't make it work without a radiated and real charge field. They don't want a real radiated charge field, and they don't want to have to follow real particles like photons and electrons. That is too hard and it limits their freedom to theorize wildly and do fudgy math. So they stick with unassigned fields and poorly assigned maths, although far simpler answers have long been available. And since I came along, they can no longer claim that mechanical answers are impossible at the quantum level (as Bohr assured them). I have found the answers and offered them to the mainstream on a silver platter, and they still prefer to look away. That is not ignorance, that is just orneriness.