

I call that the tetrads which are associated with the conserved. With the short-wavelength general solution, the j-currents are not essential. I find that the valence j-currents are not associated with the conserved current at the short-wavelength limit. They are associated only with the short-wavelength limit of the propagation current. I leave it to more advanced students to see that the j-currents are in the same vectorial sense as the d-currents, and the q-currents as well. Photons are the short-wavelength limit of the electric current. Otherwise, these currents are associated with the conserved current. For a finite slab with velocity v , the d-current cannot exist because the d-plane is now at rest relative to the q-plane. The q-current simply flows away from the d-plane. All the short-wavelength currents are associated with the conserved current. In this case, no conserved d-current exists. In the long-wavelength limit, both electric and magnetic fields must exist at all points, even at a point in the d-plane. The vectorial sense of the short-wavelength limit currents agrees with the sense of the electric and magnetic fields. In fact, the long-wavelength limit of the electric and magnetic fields already associated with currents was mentioned in section (1.1) under the name of the composite fields. It is a well-known fact that the d-plane extends indefinitely in the long-wavelength limit. Thus, for a slab with velocity v , the d-current must go to infinity as well. The magnetic current can go to infinity, but it can never exist for a finite slab. For a finite slab with velocity v , the long-wavelength limit should be regarded as a q-current. Thus, for a finite slab with velocity v , the electric current associated with the long-wavelength limit should be regarded as a q-current as well. Then the question arises as to how we should consider the full wave in the long-wavelength limit. Obviously, if we are in a position to describe long-wavelength waves at all, there are certain conserved quantities available to us. In the Maxwell equations, the electric current associated with a long-wavelength wave is a current in a defined direction, not a curl of a field. A curl of a field is zero only for exact fields. I



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