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Abstract:	We use group theoretic ideas and coset space methods to deal with problems in polarization optics of a global nature. The well-known impossibility of a globally smooth phase convention for electric fields for all points on the Poincaré sphere, and the equally well-known impossibility of real bases for transverse electric vectors for all propagation directions, are expressed in terms of coset spaces , respectively. Combining these two negative results in a judicious manner, by making the singularities in coset representatives in the two cases cancel one another, the known possibility of a globally smooth complex basis for transverse electric vectors, and its essential uniqueness, are shown. We find that apart from the groups and which occur naturally in these problems, the group also plays an important role.
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