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Radiation of Surface Polaritons in Cylindrical Channels

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We investigate the radiation of surface polaritons by a charged particle moving parallel to the axis of a dielectric cylinder immersed in homogeneous medium. Both the cases of the charge motion inside and outside the cylinder are discussed. The electromagnetic fields in the exterior and interior media are evaluated by using the Green tensor. The parts in the fields corresponding to surface polaritons localized near the cylindrical interface are extracted explicitly. By using those fields the energy fluxes inside and outside the cylinder are studied for general case of the dispersion of the active medium with negative dielectric permittivity. The general results are specified for the Drude model of dispersion. The total energy losses of the charged particle are investigated as well. The corresponding results are compared with the energy losses on guiding modes of the dielectric cylinder.

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