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Long-Range Transmission of Evanescent Waves SIMIN FENG, JOHN ELSON, PAMELA OVERFELT, Naval Air Warfare Center, Research Department — Metal/dielectric periodic multilayer structures are shown to exhibit a new type of photonic transmission bands corresponding to resonant tunneling of evanescent waves. We show that evanescent fields can propagate over long distances as Bloch waves. This occurs by means of surface wave resonant coupling with electron plasma oscillations. Consistent with this, we also find that plane wave transmission across a metal/dielectric periodic multilayer structure oscillates periodically with increasing number of metal/dielectric pairs. The presence of the Bloch evanescent states provides a channel for optical tunneling and the long-range transmission of the evanescent waves. The structures considered here can be fabricated with existing nanotechnology.

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