

**Inverses of k -Toeplitz matrices for resonator arrays
with multiple receivers**

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Wireless power transfer systems allow to avoid electrical contact and transfer power in rough environments with water, dust or dirt. They are used in electrical vehicle and mobile devices charging, biomedical devices powering, etc. But they have a drawback: in case of misalignment or distance from the transmitter to the receiver, the efficiency and power transmitted can drop abruptly. To overcome this inconvenience, arrays of resonators arranged in a plane are used to transfer power over longer distances through magnetic coupling, with receivers placed over the array to absorb the power transmitted. In the literature, these arrays have been examined using magnetoinductive wave theory or through the circuit analysis of the array, however considering only arrays with one receiver placed over them. Here we present the study of arrays with multiple receivers for which an arbitrary pattern of receivers is repeated over every k resonators. In this case, the impedance matrix representing the circuit is tridiagonal with equal upper and lower diagonals and periodic main diagonal of period k . We show how to invert those matrices, by computing their determinants through linear recurrence relations and then using them to compute the minors appearing in the cofactor matrix. In this way we are able to provide rational formulas for the currents, power transmission and efficiency of the system.

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