Localized modes induced by distributed impurities in resonant circuit arrays

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Abstract:A localized mode is generated by a distributed impurity induced by en external coil placed on a resonant circuit array. The localized mode is possibly applicable to wireless power transfer since the magnetic flux is spontaneously localized around the external coil. However, the frequency of the localized mode fluctuates for the position of the external coil. We investigated how to reduce the frequency fluctuation by adjusting the interval of resonant circuits and the diameter of the external coil. A specific design that makes the frequency fluctuation almost zero has found numerically. The circular coils in the resonant circuit array are overlapped of almost 40% of its diameter, and the diameter of the external coil is almost double that of the coil in the resonant circuit array. Also, the design is confirmed by analytical solutions which are derived for approximated models.

Keywords: Localized mode, Resonant ciruict array, Distributed impurity, Wireless power transfer.