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# Exact Model for Mode-Dependent Gains and Losses in Multimode Fiber

## Keang-Po Ho

*(Submitted on 3 Apr 2012)*

In the strong mode coupling regime, the model for mode-dependent gains and losses (collectively referred as MDL) of a multimode fiber is extended to the region with large MDL. The MDL is found to have the same statistical properties as the eigenvalues of the summation of two matrices. The first matrix is a random Gaussian matrix with standard deviation proportional to the accumulated MDL. The other matrix is a deterministic matrix with uniform eigenvalues proportional to the square of the accumulated MDL. The results are analytically correct for fibers with two or large number of modes, and also numerically verified for other cases.

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