Supplemental material

Spectral properties of the Laplacian of multiplex networks

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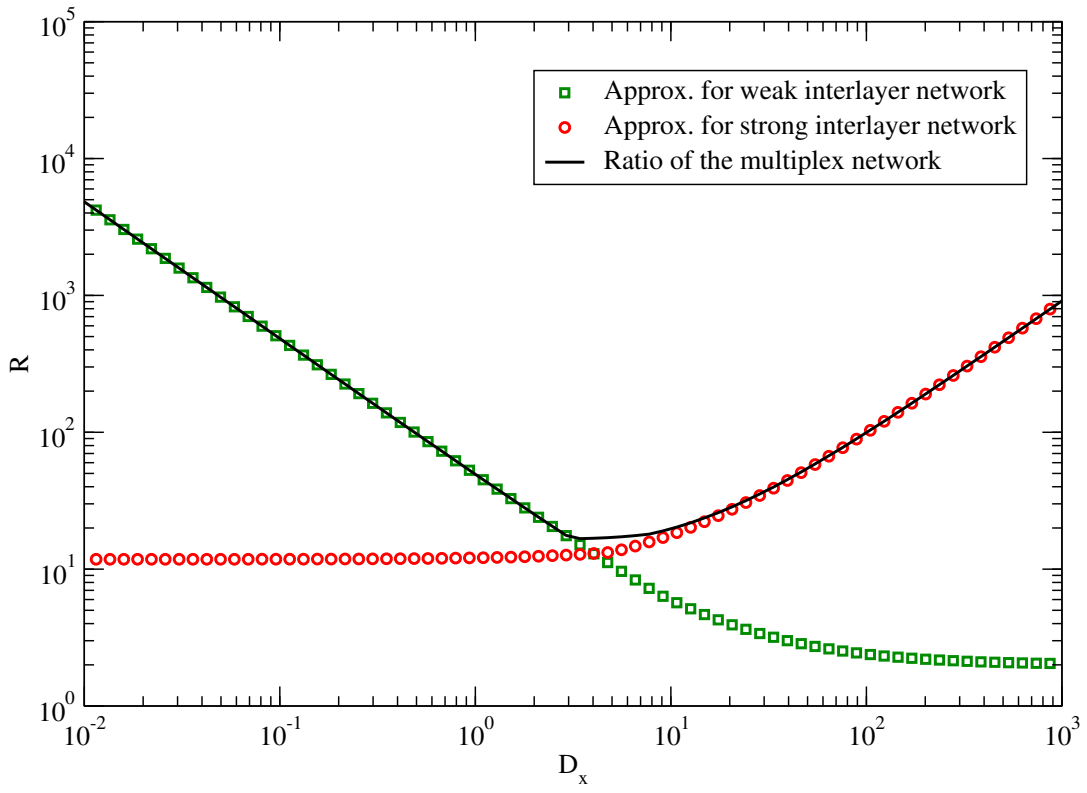

Figure 1: Plot of the eigen-ratio and the proposed approximation for a multiplex of 3 layers. Each layers contains a scale-free network of 200 nodes generated using the Barábasi-Albert model.

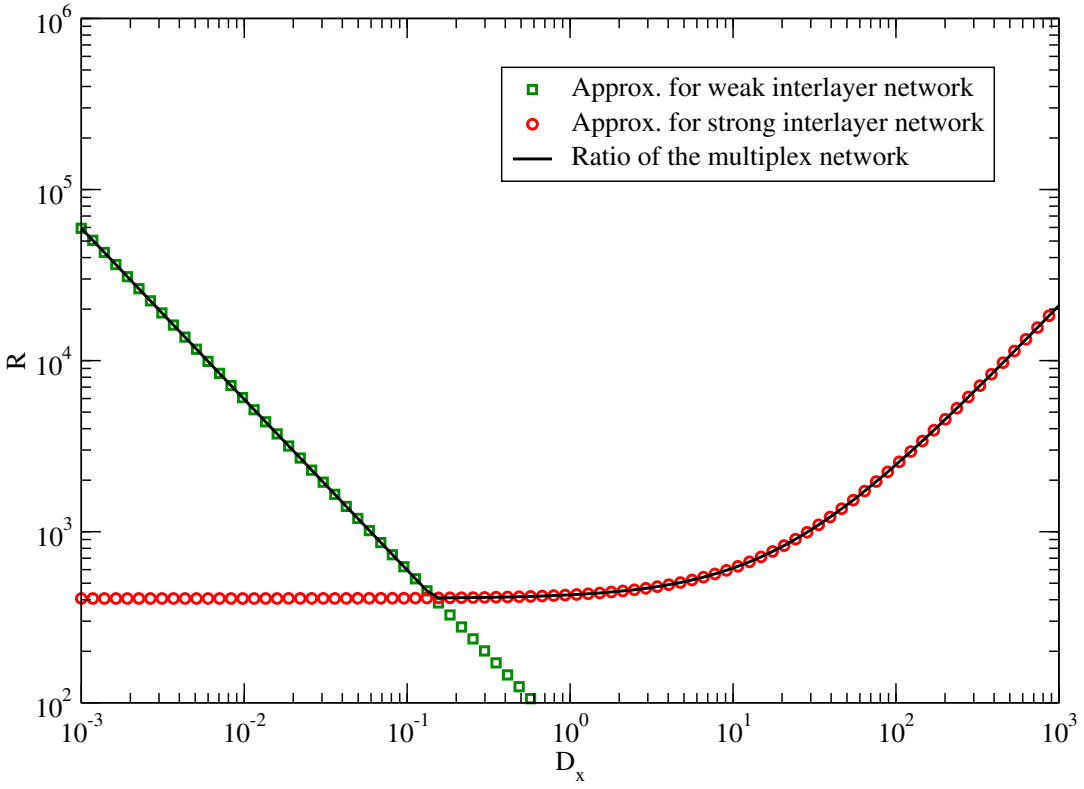

Figure 2: Plot of the eigen-ratio and the proposed approximation for a multiplex of 3 layers. Each layers contains a network with 4 communities, each community corresponds to an Erdös-Rényi network with edge probability 0.5, and the inter-community edge probability is 0,1. The communities between different layers strongly overlap.

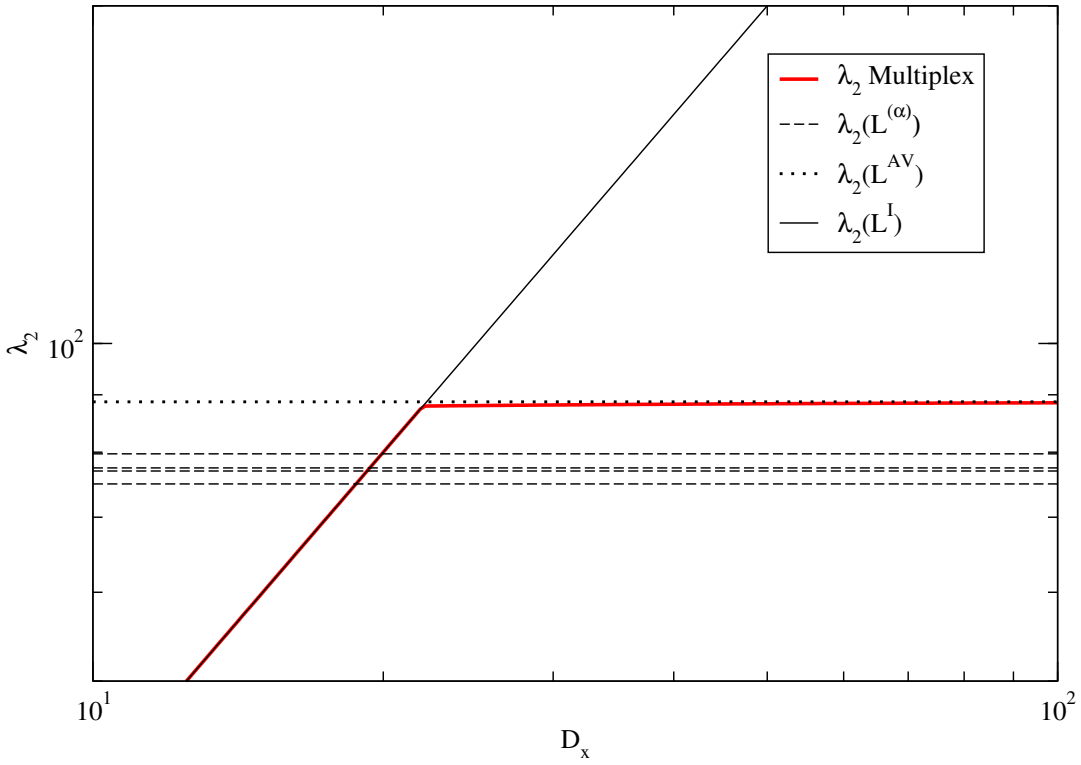

Figure 3: Comparison between the second eigenvalue of the different laplacians for a multiplex of 4 layers. Each layers contains an Erdös-Rényi of 200 nodes with edge probability of 0.5.

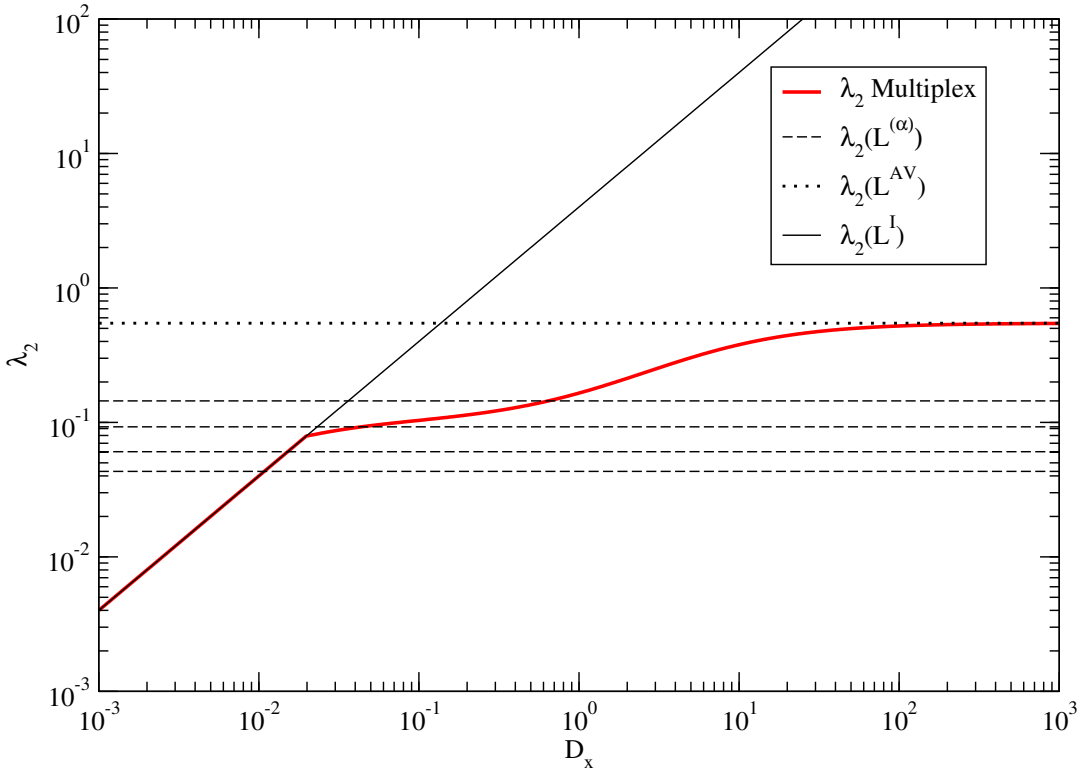

Figure 4: Comparison between the second eigenvalue of the different laplacians for a multiplex of 4 layers. Each layers contains a network with 4 communities, each community corresponds to an Erdös-Rényi network with edge probability 0.5, and the inter-community edge probability is 0,05. The communities between different layers strongly overlap.

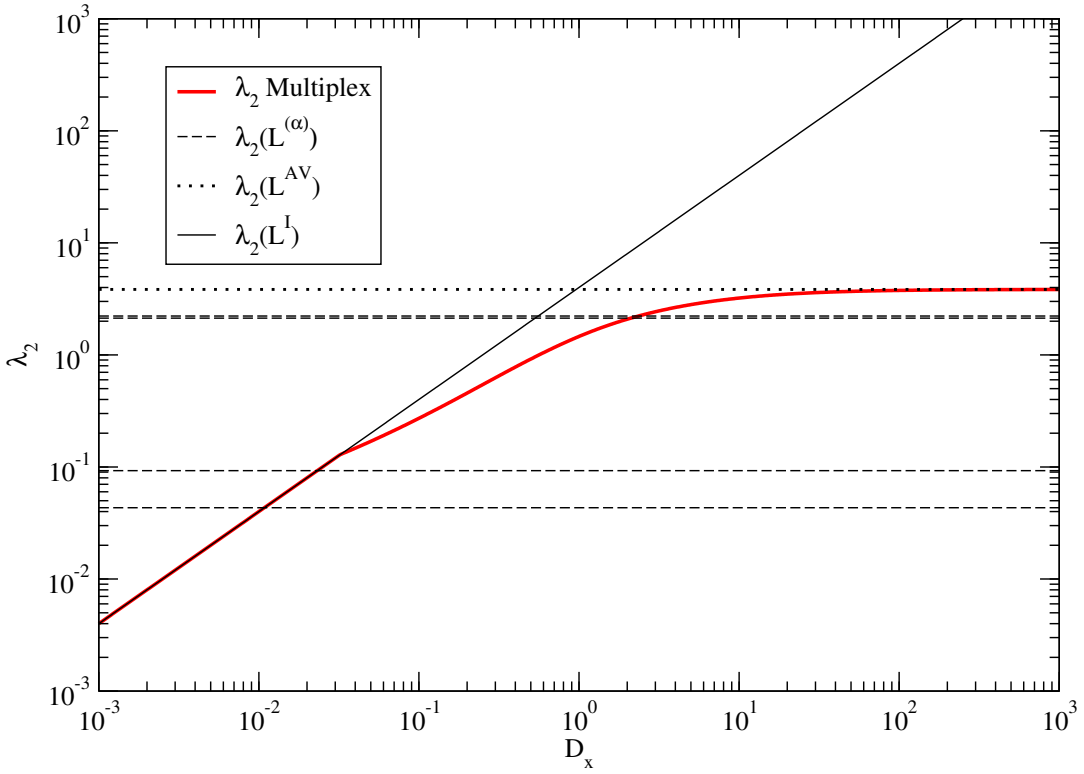

Figure 5: Comparison between the second eigenvalue of the different laplacians for a multiplex of 4 layers. Two of the layers contain a network with 4 communities, each community corresponds to an Erdös-Rényi network with edge probability 0.5, and the inter-community edge probability is 0,05. The two communities strongly overlap. The other two layers contain an Erdös-Rényi network of 200 nodes with edge probability of 0.5.

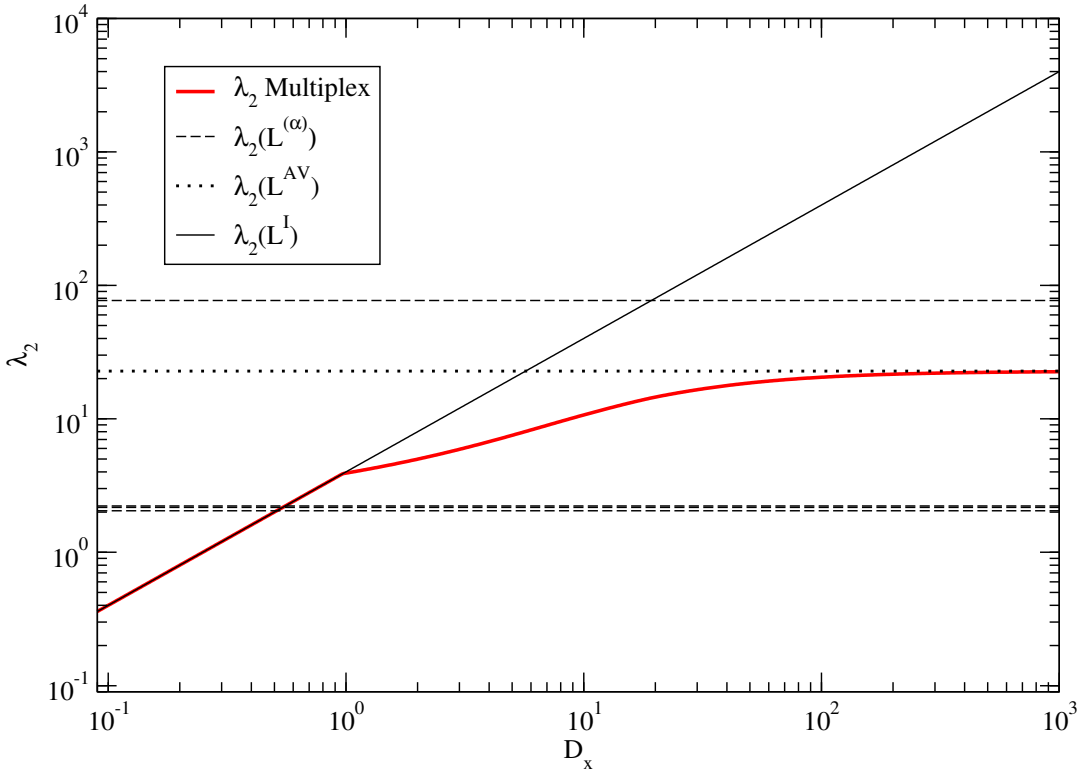

Figure 6: Comparison between the second eigenvalue of the different laplacians for a multiplex of 4 layers. Three of the layers contain a scale-free network of 200 nodes generated using the Barábasi-Albert model. The other layer contain an Erdös-Rényi network of 200 nodes with edge probability of 0.5.

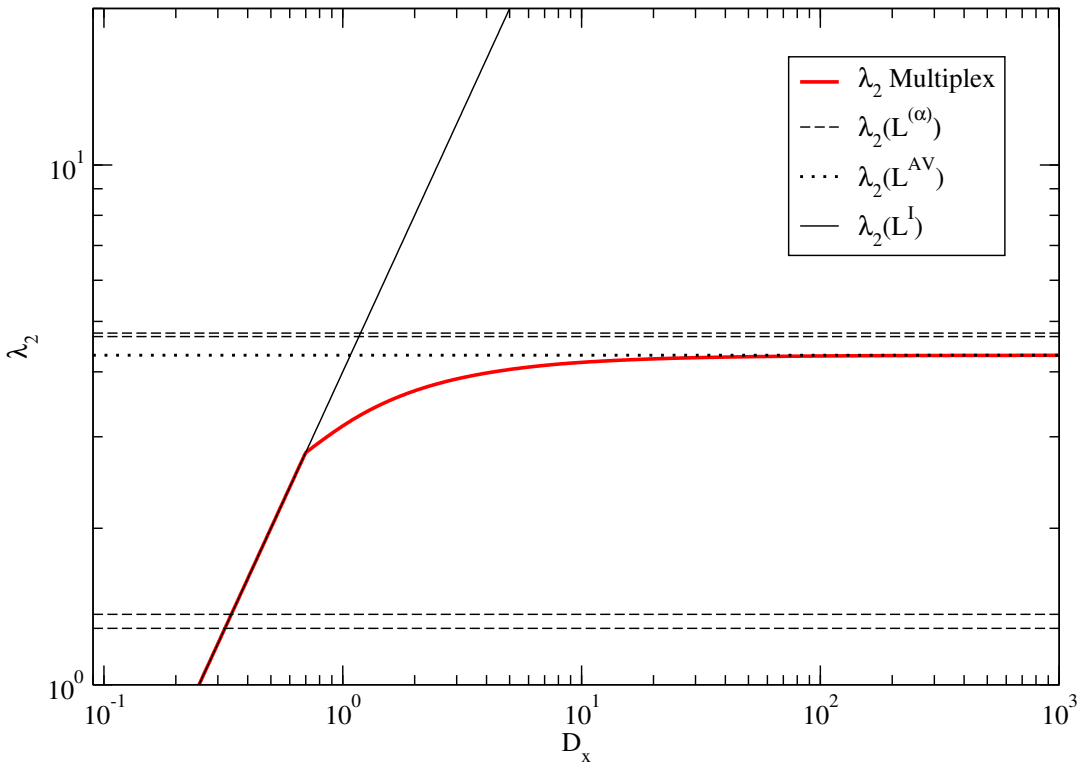

Figure 7: Comparison between the second eigenvalue of the different laplacians for a multiplex of 4 layers. Each layers contains a scale-free network of 200 nodes generated using the Barábasi-Albert model. The first two layers have been generated attaching, at each step, the new node to a 3 existing nodes, the third and fourth layers attaching the new node to a 7 existing nodes.