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Power Grid Optimization using Ant Colony Optimization
Enter the number of substations: 3

Enter the power demand (MW) for each substation:
Power demand at Substation 1 (MW): 2
Power demand at Substation 2 (MW): 3
Power demand at Substation 3 (MW): 5

Enter the transmission line lengths (km) between substations:
Line length between Substation 1 and Substation 2 (km): 5
Line length between Substation 1 and Substation 3 (km): 4
Line length between Substation 2 and Substation 3 (km): 8

Enter the maximum transmission line capacities (MW):
Maximum capacity of line between Substation 1 and Substation 2 (MW): 3
Maximum capacity of line between Substation 1 and Substation 3 (MW): 2
Maximum capacity of line between Substation 2 and Substation 3 (MW): 1

Starting optimization process...
Iteration 1/100 - Best Power Loss: 0.03
Iteration 2/100 - Best Power Loss: 0.03
Iteration 3/100 - Best Power Loss: 0.03
Iteration 4/100 - Best Power Loss: 0.03
Iteration 5/100 - Best Power Loss: 0.03
Iteration 6/100 - Best Power Loss: 0.03
Iteration 7/100 - Best Power Loss: 0.03
Iteration 8/100 - Best Power Loss: 0.03
Iteration 9/100 - Best Power Loss: 0.03
Iteration 10/100 - Best Power Loss: 0.03
Iteration 11/100 - Best Power Loss: 0.03
Iteration 12/100 - Best Power Loss: 0.03
Iteration 13/100 - Best Power Loss: 0.03
Iteration 14/100 - Best Power Loss: 0.03
Iteration 15/100 - Best Power Loss: 0.03
Iteration 16/100 - Best Power Loss: 0.03
Iteration 17/100 - Best Power Loss: 0.03
Iteration 18/100 - Best Power Loss: 0.03
Iteration 19/100 - Best Power Loss: 0.03
Iteration 20/100 - Best Power Loss: 0.03
Iteration 21/100 - Best Power Loss: 0.03
Iteration 22/100 - Best Power Loss: 0.03
Iteration 23/100 - Best Power Loss: 0.03
Iteration 24/100 - Best Power Loss: 0.03
Iteration 25/100 - Best Power Loss: 0.03
Iteration 26/100 - Best Power Loss: 0.03
Iteration 27/100 - Best Power Loss: 0.03
Iteration 28/100 - Best Power Loss: 0.03
Iteration 29/100 - Best Power Loss: 0.03
Iteration 30/100 - Best Power Loss: 0.03
Iteration 31/100 - Best Power Loss: 0.03
Iteration 32/100 - Best Power Loss: 0.03
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Iteration 56/100 - Best Power Loss: 0.03
Iteration 57/100 - Best Power Loss: 0.03
Iteration 58/100 - Best Power Loss: 0.03
Iteration 59/100 - Best Power Loss: 0.03
Iteration 60/100 - Best Power Loss: 0.03
Iteration 61/100 - Best Power Loss: 0.03
Iteration 62/100 - Best Power Loss: 0.03
Iteration 63/100 - Best Power Loss: 0.03
Iteration 64/100 - Best Power Loss: 0.03
Iteration 65/100 - Best Power Loss: 0.03
Iteration 66/100 - Best Power Loss: 0.03
Iteration 67/100 - Best Power Loss: 0.03
Iteration 68/100 - Best Power Loss: 0.03
Iteration 69/100 - Best Power Loss: 0.03
Iteration 70/100 - Best Power Loss: 0.03
Iteration 71/100 - Best Power Loss: 0.03
Iteration 72/100 - Best Power Loss: 0.03
Iteration 73/100 - Best Power Loss: 0.03
Iteration 74/100 - Best Power Loss: 0.03
Iteration 75/100 - Best Power Loss: 0.03
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Iteration 83/100 - Best Power Loss: 0.03
Iteration 84/100 - Best Power Loss: 0.03
Iteration 85/100 - Best Power Loss: 0.03
Iteration 86/100 - Best Power Loss: 0.03
Iteration 87/100 - Best Power Loss: 0.03
Iteration 88/100 - Best Power Loss: 0.03
Iteration 89/100 - Best Power Loss: 0.03
Iteration 90/100 - Best Power Loss: 0.03
Iteration 91/100 - Best Power Loss: 0.03
Iteration 92/100 - Best Power Loss: 0.03
Iteration 93/100 - Best Power Loss: 0.03
Iteration 94/100 - Best Power Loss: 0.03
Iteration 95/100 - Best Power Loss: 0.03
Iteration 96/100 - Best Power Loss: 0.03
Iteration 97/100 - Best Power Loss: 0.03
Iteration 98/100 - Best Power Loss: 0.03
Iteration 99/100 - Best Power Loss: 0.03
Iteration 100/100 - Best Power Loss: 0.03

Optimized Power Flow Distribution:
Flow from Substation 1 to Substation 2: 0.46 MW
Flow from Substation 1 to Substation 3: 0.88 MW
Flow from Substation 2 to Substation 3: 0.60 MW
Total Power Loss: 0.03 MW
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Iteration 56/100 - Best Power Loss: 0.03
Iteration 57/100 - Best Power Loss: 0.03
Iteration 58/100 - Best Power Loss: 0.03
Iteration 59/100 - Best Power Loss: 0.03
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Iteration 61/100 - Best Power Loss: 0.03
Iteration 62/100 - Best Power Loss: 0.03
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