Fig. 2 depicts the effect of relay location where we move the relay node from the source node to the destination node. The figure shows that the SER trend of energy allocation is the same regardless of SNR, and minimum SER can be achieved by selecting the relay node approximately 5.5 and 4.5 for coherent-differential and differential-coherent case, respectively.

Fig. 3 represents the effect of energy allocation where we assign 10% of total energy to the source node and change the percentage up to 90%. Similar to the location allocation case, the strength of SNR does not affect the trend of performance. The figure shows that minimum SER can be provided when 40% and 60% of total energy are assigned at the source node for coherent-differential and differential-coherent case, respectively. From the two figures, we can see that energy allocation has more flat SER variation than location allocation, i.e., the location allocation is more sensitive than the energy allocation.

4 Conclusions

In this paper, we explore the effect of energy and location allocation for asymmetric dual-hop communication systems. The results reveal that the optimum point which shows minimum SER is different depending on channel conditions where this result is different from the system using fully coherent or differential modulation scheme. The results also show that the relay location is more crucial than energy allocation to enhance the performance of system.

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