東北大学大学院情報科学研究科
純粋・応用数学研究センター

情報数理談話会のお知らせ

日　時： 2022 年 6 月 27 日㈪ 13:30 より 14:30 まで
場　所： Google Meet によりオンラインで開催
　　　　※参加方法はホームページをご覧下さい

講演者： Mohamed Fuard Mohamed Sabri 氏（東北大学大学院情報科学研究科)
題　目： On the tailed model of quantum walks
備　考： この情報数理談話会は課程博士予備審査会を兼ねています

[概 要] In this thesis, we examine the tailed model of quantum walks. Unlike the usual quantum walks, the tailed model guarantees the convergence of the state of the walker to a stationary state. We consider two types of quantum dynamics, the Szegedy dynamics and a Grover-like dynamics. We obtain the scattering of the walk for these two dynamics in the long run, and based on the scattering matrix in the latter case, we obtain a characterization of bipartite graphs. Moreover, we show that, in the Szegedy walk case, the stationary state expresses an electric current function which satisfies the Kirchhoff current and voltage laws, and in the Grover-like dynamics, if the underlying graph is (non-)bipartite, the stationary state expresses a (pseudo-)current function which satisfies (pseudo-)Kirchhoff laws. Furthermore, in the Grover-like case, we introduce a quantum analogy of the electrical energy, called 'comfortability' and we show that the comfortability of the underlying graph can be expressed in terms of the combinatorial properties of the graph. Finally, we discuss a quantum search algorithm on complete graphs, which gives two types of finding probabilities, a maximum probability which is similar to the usual quantum search algorithms and a converging finding probability which arises from the converging property in our model.

ホームページ：https://www.math.is.tohoku.ac.jp/research/colloquium.html