The quadratic shortest path problem

The quadratic shortest path problem (QSPP) is the problem of finding a path in a digraph such that the sum of weights of arcs and the sum of interaction costs over all pairs of arcs on the path is minimized. This problem is known to be NP-hard.
In this talk we consider linearizable QSPP instances whose optimal solution can be found by solving the corresponding instance of the shortest path problem. We also present a polynomial-time algorithm that verifies whether a QSPP instance on the directed grid graph is linearizable, and if it is linearizable our algorithm returns the corresponding linearization vector. Further, we present a semidefinite programming relaxation for the problem that provides good bounds for non-linearizable problem instances.