I. RANDOM MIXED STRATEGIES IN QUANTUM HAWK-DOVE GAME

Here we will choose, "H" as,

$$\hat{U}(0,0) = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \tag{1}$$

and "D" as,

$$\hat{U}(\pi/2,0) = \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix} \tag{2}$$

(representing the strategies corresponding to pure *Hawk(H)* and *Dove(D)*). In particular, we may choose the initial state as $\hat{J}|DD\rangle$

A. Classical Game

		Bob	
		H	D
	H	(-25,-25)	(50,0)
Alice	D	(0,50)	(15,15)

(3)

B. Adding Classical random mixed Strategy

For Hawk Dove game, the third NE is a mixed strategy when p = 7/12,

The following table is for p = 7/12 and q = 7/12,

		Bob		
		H	D	R_{HD}
	H	(-25,-25)	(50,0)	(6.25, -14.58)
Alice	D	(0,50)	(15,15)	(6.25, 35.42)
	RHD	(-14.58, 6.25)	(35.42, 6.25)	(6.25, 6.25)

(4)

C. Adding Quantum Strategy Q

		Bob		
		H	D	Q
	H	(-25,-25)	(50,0)	(0, 50)
Alice	D	(0,50)	(15,15)	(-25,-25)
	Q	(50,0)	(-25,-25)	(15,15)

(5)

D. When Alice and Bob are restricted to play only the Quantum Strategies

		Bob	
		Q	M
	Q	(15, 15)	(32.5, 7.5)
Alice	M	(7.5, 32.5)	(10, 10)

(6)

NE is (Q, Q)

E. Adding Quantum random mixed Strategy

The following table is for p = 7/12 and q = 7/12,

		Bob		
		Q	M	R_{QM}
Alice	Q	(15, 15)	(32.5, 7.5)	(22.29, 11.88)
	M	(7.5, 32.5)	(10, 10)	(8.54, 23.12)
	RQM	(11.88, 22.29)	(23.12, 8.54)	(16.56, 16.56)

(7)

Its interesting to note here that, though (R_{QM}, R_{QM}) is the dominant equal strategy for both of the players, none of the strategies here are gonna face any significant losses since all payoffs are greater than 0.