**DESIRED TRAJECTORIES**

**1. Elliptical Trajectory**

**2. Rectangular Trajectory**

**FORWARD KINEMATICS (FK)**

**DIFFERENTIAL KINEMATICS**

**NON-HOLONOMIC CONSTRAINT**

**JACOBIAN MATRIX, TASK SPACE VARIABLES & CONFIGURATION-SPACE VARIABLES**

, , ,

, , ,

**MOBILE ROBOT WHEEL VELOCITIES**

Hence, solving the above two equations in two variables ( and ) we get,

**JACOBIAN MATRICES WITH DIFFERENT CONSTRAINTS**

No Auxiliary Constraint: Only Non-Holonomic Constraint []

Auxiliary Constraint:

Auxiliary Constraint:

**REDUNDANCY RESOLUTION - PSEUDOINVERSE METHOD**

**REDUNDANCY RESOLUTION – AUGMENTED TASK-SPACE METHOD**

**REDUNDANCY RESOLUTION - ARTIFICIAL POTENTIAL METHOD**

**CLOSED-LOOP RESOLVED RATE MOTION CONTROL IN CONFIGURATION-SPACE**

, where and with

**CLOSED-LOOP RESOLVED RATE MOTION CONTROL IN TASK-SPACE**

, where and with