**TEST NO GRAVITY – ONLY TORQUE CONSTRAINTS**

**BENCHMARKS 2R PLANAR (NO WAYPOINTS)**

|  |  |  |
| --- | --- | --- |
| **TEST** | **CONFIGURATIONS** | **OPTIMAL TIME** |
| **1** | **qi = (0, 0)**  **qf = (pi/2, 0)** | **0.997s** |
| **2** | **qi = (0, 0)**  **qf = (3\*pi/4, pi/4)** | **1.295s** |
| **3** | **qi = (0, 0)**  **qf = (3\*pi/4, -pi/4)** | **1.133s** |
| **4** | **qi = (0, 0)**  **qf = (2\*pi, 0)** | **1.995s** |
| **5** | **qi = (0, 0)**  **qf = (pi, 0)** | **1.411s** |

**CONSTRAINTS:**

* **Joint Torques +-20 Nm (all Joints)**

**BENCHMARKS 3R PLANAR (NO WAYPOINTS)**

|  |  |  |
| --- | --- | --- |
| **TEST** | **CONFIGURATIONS** | **OPTIMAL TIME** |
| **1** | **qi = (0, 0, 0)**  **qf = (pi/2, 0, 0)** | **1.238s** |
| **2** | **qi = (0, 0, 0)**  **qf = (3\*pi/4, -pi/4, 0)** | **1.360s** |
| **3** | **qi = (0, 0, 0)**  **qf = (3\*pi/4, -pi/4, -pi/2)** | **1.221s** |
| **4** | **qi = (0, 0, 0)**  **qf = (2\*pi, 0, 0)** | **2.475s** |
| **5** | **qi = (0,0, 0)**  **qf = (pi, 0, 0)** | **1.750s** |

**CONSTRAINTS:**

* **Joint Torques +-40, +-35, +-30 Nm**

**2R OPTIMAL (MULTIPLE WAYPOINTS)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **TEST** | **CONFIGURATIONS** | **# OF WAYPOINTS** | **1st TRAJ. TIME** | **OPTIMTIME** | **Execution Time** |
| **1** | **qi = (0, 0)**  **qf = (pi/2, 0)** | **1** | **0.997s** | **0.897s** | **36s** |
|  |  | **2** | **-** | **0.892s** | **74s** |
|  |  | **3** | **-** | **0.866s** | **110s** |
|  |  | **4** | **-** | **0.862s** | **280s** |
|  |  | **5** | **-** | **0.844s** | **396s** |
|  |  | **10** | **-** | **0.821s** | **604s** |
| **2** | **qi = (0, 0)**  **qf = (3\*pi/4, pi/4)** | **1** | **1.295s** | **1.082s** | **37s** |
|  |  | **2** | **-** | **1.024s** | **45s** |
|  |  | **3** | **-** | **0.926s** | **153s** |
|  |  | **4** | **-** | **0.925s** | **286s** |
|  |  | **5** | **-** | **0.916s** | **386s** |
|  |  | **10** | **-** | **0.904s** | **536s** |
| **3** | **qi = (0, 0)**  **qf = (3\*pi/4, -pi/4)** | **1** | **1.133s** | **0.923s** | **21s** |
|  |  | **2** | - | **0.908s** | **63s** |
|  |  | **3** | **-** | **0.856s** | **171s** |
|  |  | **4** | **-** | **0.853s** | **267s** |
|  |  | **5** | **-** | **0.848s** | **320s** |
|  |  | **10** | **-** | **0.839s** | **631s** |
| **4** | **qi = (0, 0)**  **qf = (2\*pi, 0)** | **1** | **1.995s** | **1.544s** | **73s** |
|  |  | **2** | **-** | **1.509s** | **189s** |
|  |  | **3** | **-** | **1.289s** | **210s** |
|  |  | **4** | **-** | **1.278s** | **272s** |
|  |  | **5** | **-** | **1.273s** | **392s** |
|  |  | **10** | **-** | **1.197s** | **558s** |
| **5** | **qi = (0, 0)**  **qf = (pi, 0)** | **1** | **1.411s** | **1.179s** | **65s** |
|  |  | **2** | **-** | **1.182s** | **113s** |
|  |  | **3** | **-** | **1.045s** | **191s** |
|  |  | **4** | **-** | **1.037s** | **256s** |
|  |  | **5** | **-** | **1.026s** | **357s** |
|  |  | **10** | **-** | **1.005s** | **527s** |

**3R OPTIMAL (MULTIPLE WAYPOINTS)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **TEST** | **CONFIGURATIONS** | **# OF**  **WAYPOINTS** | **1st TRAJ. TIME** | **OPT TIME** | **# ITER** |
| **1** | **qi = (0, 0, 0)**  **qf = (pi/2, 0, 0)** | **1** | **1.238s** | **1.118s** | **183s** |
|  |  | **2** | **-** | **1.033s** | **198s** |
|  |  | **3** | **-** | **1.007s** | **284s** |
|  |  | **4** | **-** | **0.867s** | **580s** |
|  |  | **5** | **-** | **0.912s** | **763s** |
|  |  | **10** | **-** | **0.835s** | **1208s** |
| **2** | **qi = (0, 0, 0)**  **qf = (3\*pi/4, -pi/4, 0)** | **1** | **1.360s** | **1.175s** | **50s** |
|  |  | **2** | **-** | **1.120s** | **149s** |
|  |  | **3** | **-** | **0.984s** | **321s** |
|  |  | **4** | **-** | **0.965s** | **644s** |
|  |  | **5** | **-** | **0.959s** | **739s** |
|  |  | **10** | **-** | **0.943s** | **1515s** |
| **3** | **qi = (0, 0, 0)**  **qf = (3\*pi/4, -pi/4,-pi/2)** | **1** | **1.221s** | **1.046s** | **72s** |
|  |  | **2** | **-** | **0.967s** | **267s** |
|  |  | **3** | **-** | **0.962s** | **388s** |
|  |  | **4** | **-** | **0.955s** | **635s** |
|  |  | **5** | **-** | **0.953s** | **743s** |
|  |  | **10** | **-** | **0.908s** | **985s** |
| **4** | **qi = (0, 0, 0)**  **qf = (2\*pi, 0, 0)** | **1** | **2.475s** | **1.915s** | **107s** |
|  |  | **2** | **-** | **1.613s** | **165s** |
|  |  | **3** | **-** | **1.421s** | **420s** |
|  |  | **4** | **-** | **1.402s** | **651s** |
|  |  | **5** | **-** | **1.371s** | **733s** |
|  |  | **10** | **-** | **1.366s** | **1957s** |
| **5** | **qi = (0, 0, 0)**  **qf = (pi, 0, 0)** | **1** | **1.750s** | **1.446s** | **38s** |
|  |  | **2** | **-** | **1.308s** | **194s** |
|  |  | **3** | **-** | **1.254s** | **320s** |
|  |  | **4** | **-** | **1.198s** | **450s** |
|  |  | **5** | **-** | **1.162s** | **565s** |
|  |  | **10** | **-** | **1.087s** | **1625s** |