

T5: Torque on y5

T6: Torque on x6

F1m, F2m: Measured forces (1 = left, 2 = right)

theta5: y5 Joint angle

theta6: x6 Joint angle

r: radius (same on both x and y directions)

L0: Actutors Length when theta5=theta6 = 0

$$T5 = (F2m * r * (\text{abs}(L0 - r * \sin(\theta5) + r * \cos(\theta5) * \sin(\theta6))^2 + \text{abs}(r * (\cos(\theta6) - 1))^2 + \text{abs}(r * (\cos(\theta5) + \sin(\theta5) * \sin(\theta6) - 1))^2)^{1/2} * (L0 - r * \sin(\theta5) + r * \cos(\theta5) * \sin(\theta6))) / ((r * \sin(\theta6) + L0 * \cos(\theta5) * \cos(\theta6) - r * \cos(\theta6) * \sin(\theta5)) * (\text{abs}(L0 - r * \sin(\theta5) + r * \cos(\theta5) * \sin(\theta6))^2 + \text{abs}(r - r * \cos(\theta6))^2 + \text{abs}(r * \cos(\theta5) - r + r * \sin(\theta5) * \sin(\theta6))^2)^{1/2}) + (F1m * r * (r * \sin(\theta5) - L0 + r * \cos(\theta5) * \sin(\theta6)) * (\text{abs}(r * \sin(\theta5) - L0 + r * \cos(\theta5) * \sin(\theta6))^2 + \text{abs}(r * (\sin(\theta5) * \sin(\theta6) - \cos(\theta5) + 1))^2 + \text{abs}(r * (\cos(\theta6) - 1))^2)^{1/2}) / ((r * \sin(\theta6) - L0 * \cos(\theta5) * \cos(\theta6) + r * \cos(\theta6) * \sin(\theta5)) * (\text{abs}(r - r * \cos(\theta5) + r * \sin(\theta5) * \sin(\theta6))^2 + \text{abs}(r * \sin(\theta5) - L0 + r * \cos(\theta5) * \sin(\theta6))^2 + \text{abs}(r - r * \cos(\theta6))^2)^{1/2}))$$

$$T6 = (F1m * r * (r * \sin(\theta5) - L0 + r * \cos(\theta5) * \sin(\theta6)) * (\text{abs}(r * \sin(\theta5) - L0 + r * \cos(\theta5) * \sin(\theta6))^2 + \text{abs}(r * (\sin(\theta5) * \sin(\theta6) - \cos(\theta5) + 1))^2 + \text{abs}(r * (\cos(\theta6) - 1))^2)^{1/2}) / ((r * \sin(\theta6) - L0 * \cos(\theta5) * \cos(\theta6) + r * \cos(\theta6) * \sin(\theta5)) * (\text{abs}(r - r * \cos(\theta5) + r * \sin(\theta5) * \sin(\theta6))^2 + \text{abs}(r * \sin(\theta5) - L0 + r * \cos(\theta5) * \sin(\theta6))^2 + \text{abs}(r - r * \cos(\theta6))^2)^{1/2}) - (F2m * r * (\text{abs}(L0 - r * \sin(\theta5) + r * \cos(\theta5) * \sin(\theta6))^2 + \text{abs}(r * (\cos(\theta6) - 1))^2 + \text{abs}(r * (\cos(\theta5) + \sin(\theta5) * \sin(\theta6) - 1))^2)^{1/2} * (L0 - r * \sin(\theta5) + r * \cos(\theta5) * \sin(\theta6))) / ((r * \sin(\theta6) + L0 * \cos(\theta5) * \cos(\theta6) - r * \cos(\theta6) * \sin(\theta5)) * (\text{abs}(L0 - r * \sin(\theta5) + r * \cos(\theta5) * \sin(\theta6))^2 + \text{abs}(r - r * \cos(\theta6))^2 + \text{abs}(r * \cos(\theta5) - r + r * \sin(\theta5) * \sin(\theta6))^2)^{1/2}))$$