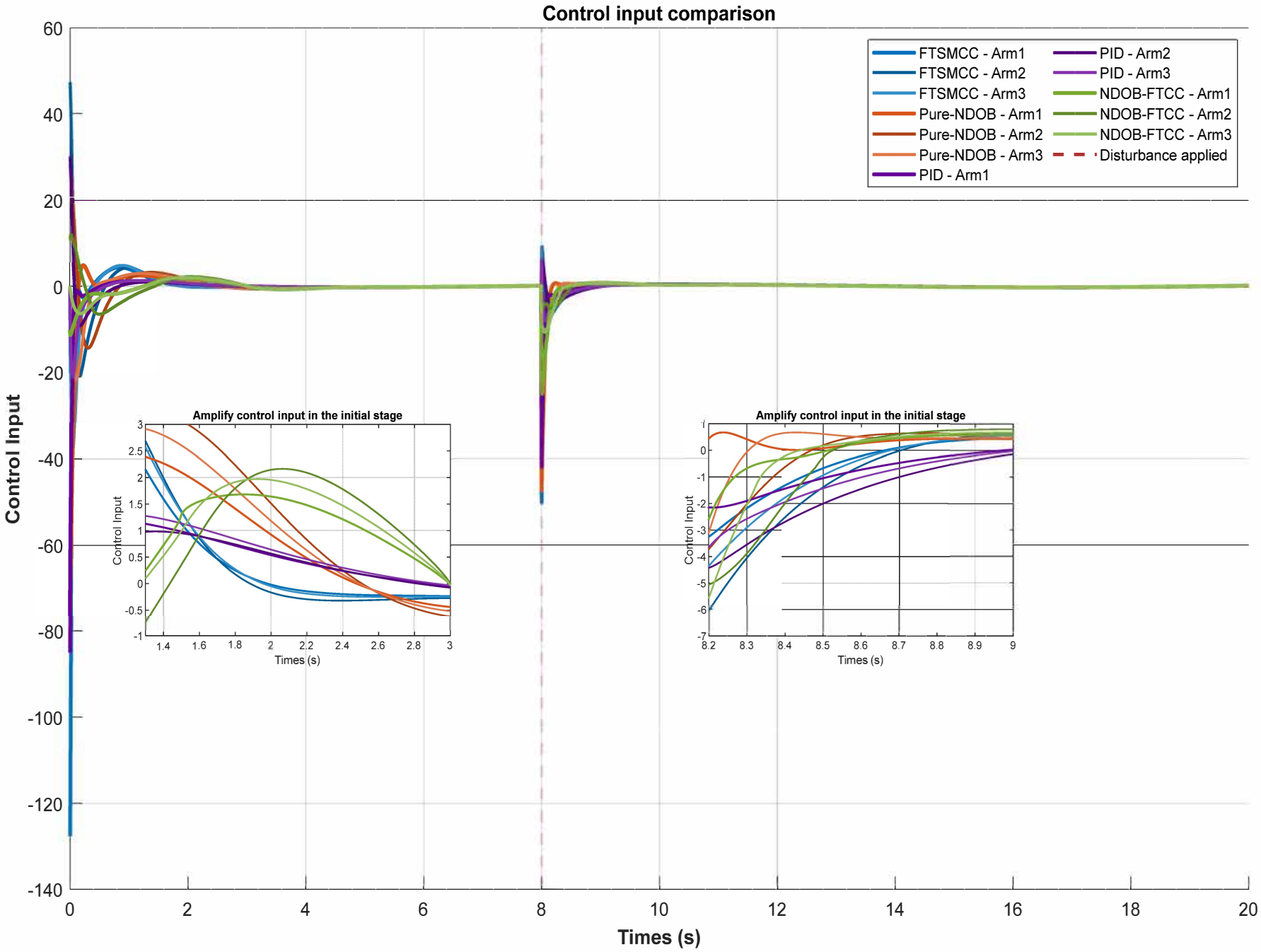

Control input comparison
FTSMCC - Arm1
FTSMCC - Arm2
FTSMCC - Arm3
Pure-NDOB - Arm1
Pure-NDOB - Arm2
Pure-NDOB - Arm3
PID - Arm1
PID - Arm2
PID - Arm3
NDOB-FTCC - Arm1
NDOB-FTCC - Arm2
NDOB-FTCC - Arm3
Disturbance applied
Control Input
Times (s)
Amplify control input in the initial stage
Control Input
Times (s)
Amplify control input in the initial stage
Control Input
Times (s)

Figure S1.

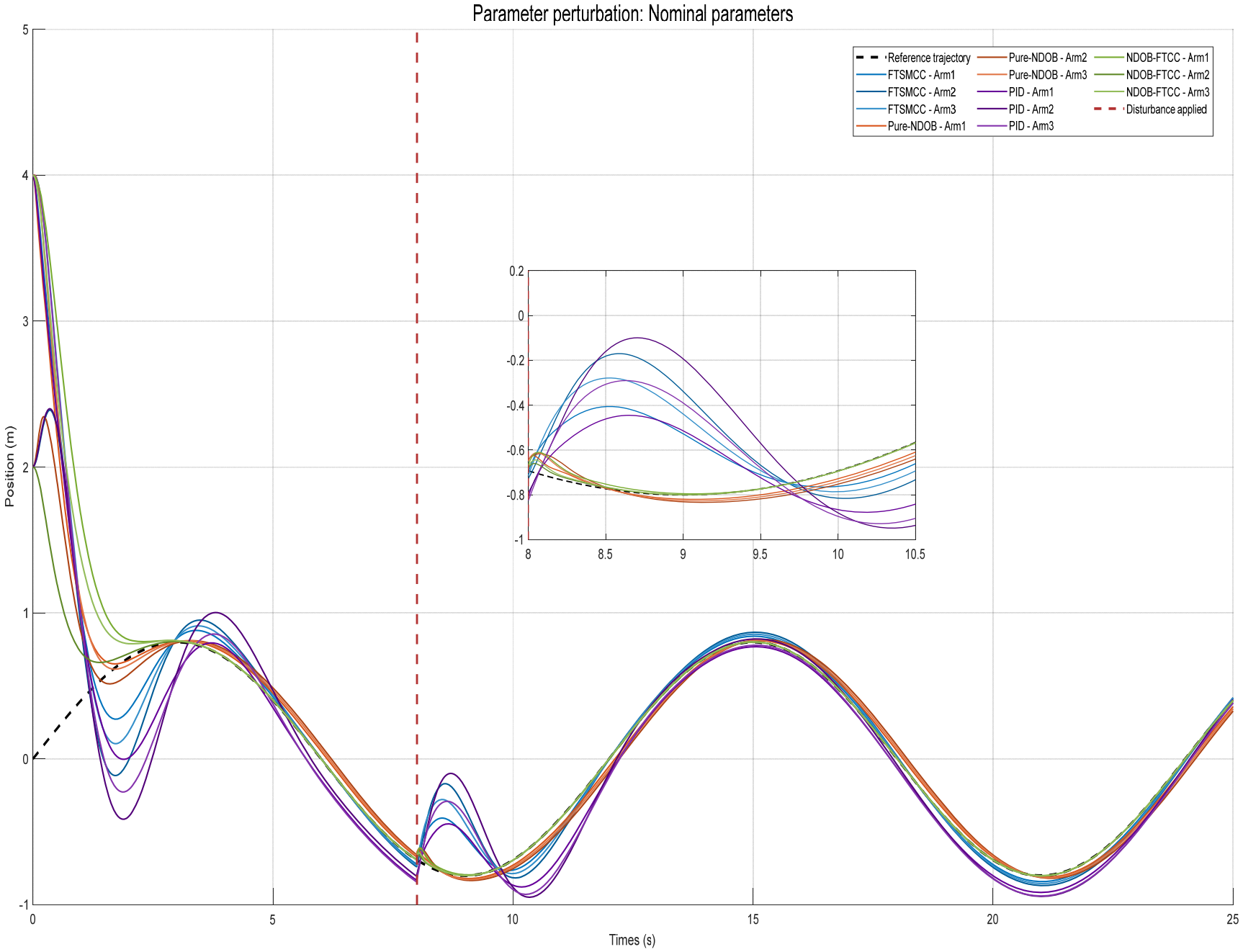

Parameter perturbation: Nominal parameters
Reference trajectory
FTSMCC - Arm1
FTSMCC - Arm2
FTSMCC - Arm3
Pure-NDOB - Arm1
Pure-NDOB - Arm2
Pure-NDOB - Arm3
PID - Arm1
PID - Arm2
PID - Arm3
NDOB-FTCC - Arm1
NDOB-FTCC - Arm2
NDOB-FTCC - Arm3
Disturbance applied
Position (m)
Times (s)

Figure S2.

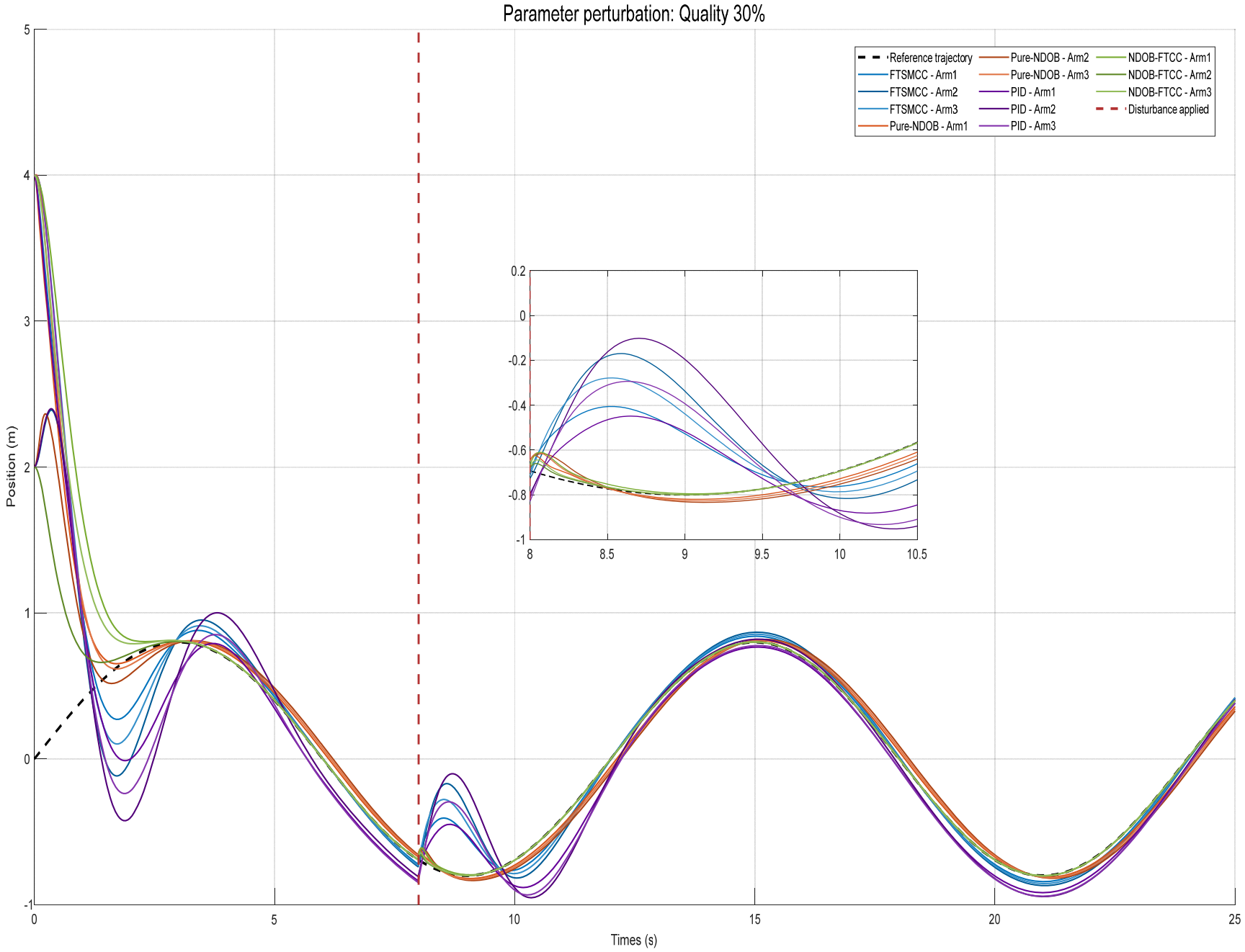

Parameter perturbation: Quality 30%
Reference trajectory
FTSMCC - Arm1
FTSMCC - Arm2
FTSMCC - Arm3
Pure-NDOB - Arm1
Pure-NDOB - Arm2
Pure-NDOB - Arm3
PID - Arm1
PID - Arm2
PID - Arm3
NDOB-FTCC - Arm1
NDOB-FTCC - Arm2
NDOB-FTCC - Arm3
Disturbance applied
Position (m)
Times (s)

Figure S3.

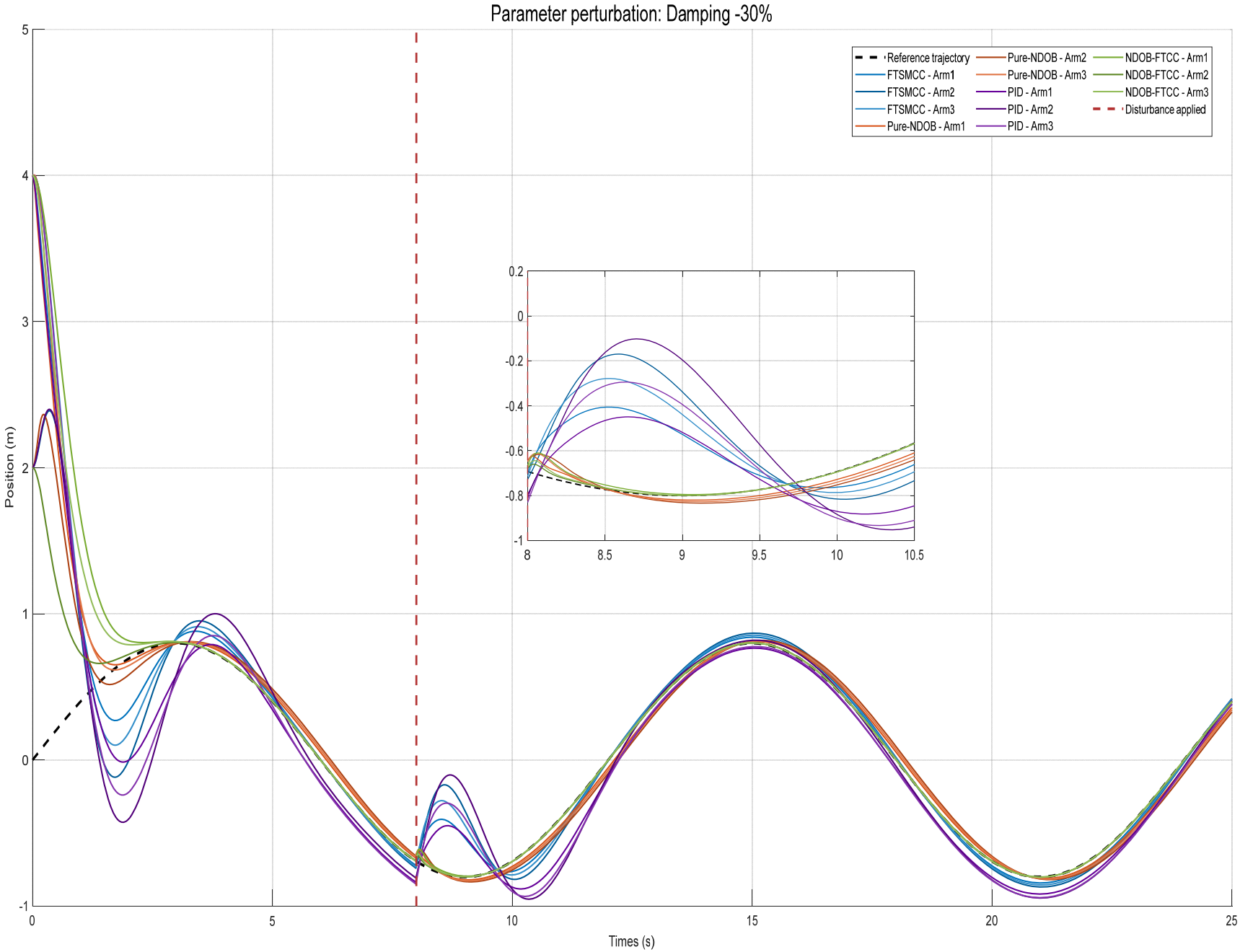

Parameter perturbation: Damping -30%
Reference trajectory
FTSMCC - Arm1
FTSMCC - Arm2
FTSMCC - Arm3
Pure-NDOB - Arm1
Pure-NDOB - Arm2
Pure-NDOB - Arm3
PID - Arm1
PID - Arm2
PID - Arm3
NDOB-FTCC - Arm1
NDOB-FTCC - Arm2
NDOB-FTCC - Arm3
Disturbance applied
Position (m)
Times (s)

Figure S4.

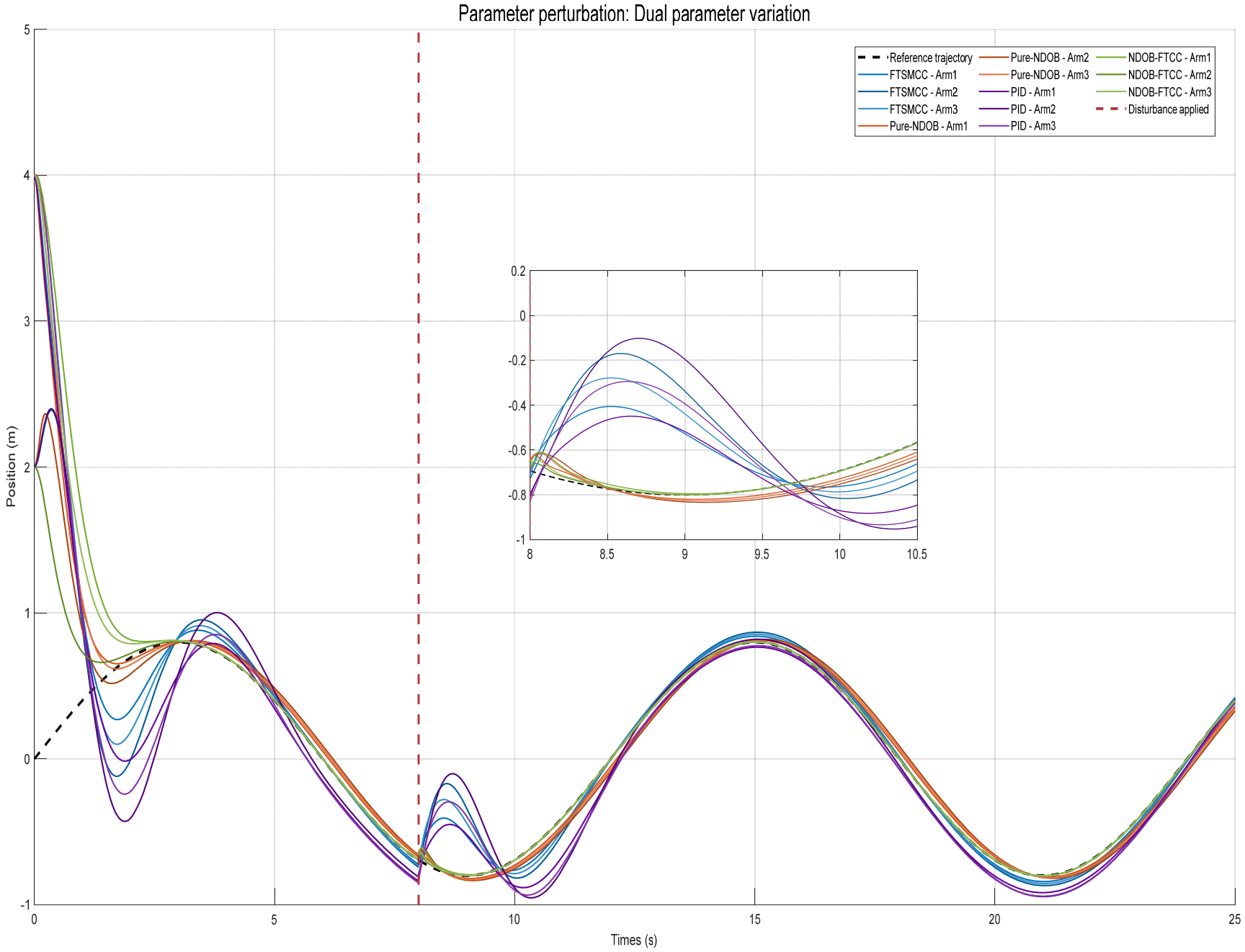

Parameter perturbation: Dual parameter variation
Reference trajectory
FTSMCC - Arm1
FTSMCC - Arm2
FTSMCC - Arm3
Pure-NDOB - Arm1
Pure-NDOB - Arm2
Pure-NDOB - Arm3
PID - Arm1
PID - Arm2
PID - Arm3
NDOB-FTCC - Arm1
NDOB-FTCC - Arm2
NDOB-FTCC - Arm3
Disturbance applied
Position (m)
Times (s)

Figure S5.