

A library of Petri nets has been developed for carrying out the tests. The library is based on eight base models which can be scaled using a parameter. Some of these models are Petri nets which are well known and frequently used in literature. The library comprises the following nets:

- *SEQ*. Petri nets of one sequential process with **ne** (1..100) states (Fig. 1.a).
- *PAR*. Petri nets of **p** (1..100) sequential processes of 2 places (Fig. 1.b).
- *PR1*. Petri nets of **p** (1..40) sequential processes of 2 states and a common resource (Fig. 1.c). These belong to s^3pr net class [15].
- *DB*. Petri nets of **b** (5..11) databases (Fig. 1.d). [16].
- *PIR*. Petri nets of 1 sequential process and **r** (1..40) resources (Fig. 1.e). These belong to s^3pr net class [15].
- *PH*. Petri nets of the philosophers' problem[17] (Fig. 1.f) with **f** (5..40) philosophers.
- *SQUARE*. Petri nets of **r** (1..40) sequential processes of **r+1** states and **r** common resources (Fig. 1.g, defined by the authors).
- *PR5*. Petri nets of **p** (5..62) sequential processes of 6 states and 5 common resources (not showed in figure). These belong to s^3pr net class [15].

Net	#P	#T	f_p	f_s	f_d	av conc	Max conc
<i>SEQ</i>	<i>ne</i>	<i>ne</i>	1	1	1	1	1
<i>PAR</i>	$2*p$	$2*p$	1	1	1	<i>p</i>	<i>p</i>
<i>PR1</i>	$1+2*p$	$2*p$	1.5	1.5	$\frac{3p}{1+2p}$	1	1
<i>DB</i>	$1+3*b^2$	$2*b^2$	$\frac{6b-3}{2b}$	$\frac{6b-3}{2b}$	$\frac{7b-3}{4b}$	$\leq b-1$	$b-1$
<i>PIR</i>	$r+1$	$r+1$	$\frac{1+2r}{1+r}$	$\frac{1+2r}{1+r}$	1	1	1
<i>PH</i>	$7*f$	$5*f$	1.6	1.6	1.14	$\frac{f}{2}$	<i>f</i>
<i>SQ.</i>	$2r+r^2$	$r+r^2$	$\frac{r+2r^2}{r+r^2}$	$\frac{r+2r^2}{r+r^2}$	$\frac{r+2r^2}{2r+r^2}$	$\frac{r}{2}$	$\left\lceil \frac{r}{2} \right\rceil$
<i>PR5</i>	$5+6*p$	$6*p$	1.83	1.83	$\frac{11p}{5+6p}$	2.5	3

Table 1 Characterization of the Petri nets composing the net library. f_p (Parallelism Factor) = average number of descending places of a transition. f_s (Synchronization Factor) = average number of input places of a transition. f_d (Descendants Factor) = average number of output transitions of a place. Av. conc. = average concurrence. Max conc. = maximum concurrence.

Each test consists of the execution of a Petri net with one of the implemented algorithms. The test concludes when 2000 transitions have fired, obtaining the coordinator task total computation time. Each net is also executed with the other implemented algorithms. We have implemented the centralized implementation techniques of PN in the Java language using the Java Real-time extension [11] and following some ideas presented in [12] [13].

The real time extension provides Java with the necessary aspects for the programming of real-time systems, e.g., pre-emptive planning based on static priorities, asynchronous transfer of control, real-time high resolution clocks, and the possibility of execution over the Java garbage collector. In our implementations, we used the Real Time Java Virtual Machine JamaicaVM v2.7 [14]. The target hardware was a personal computer with Pentium IV processor at 1.7GHz, running Red Hat Linux 2.4.

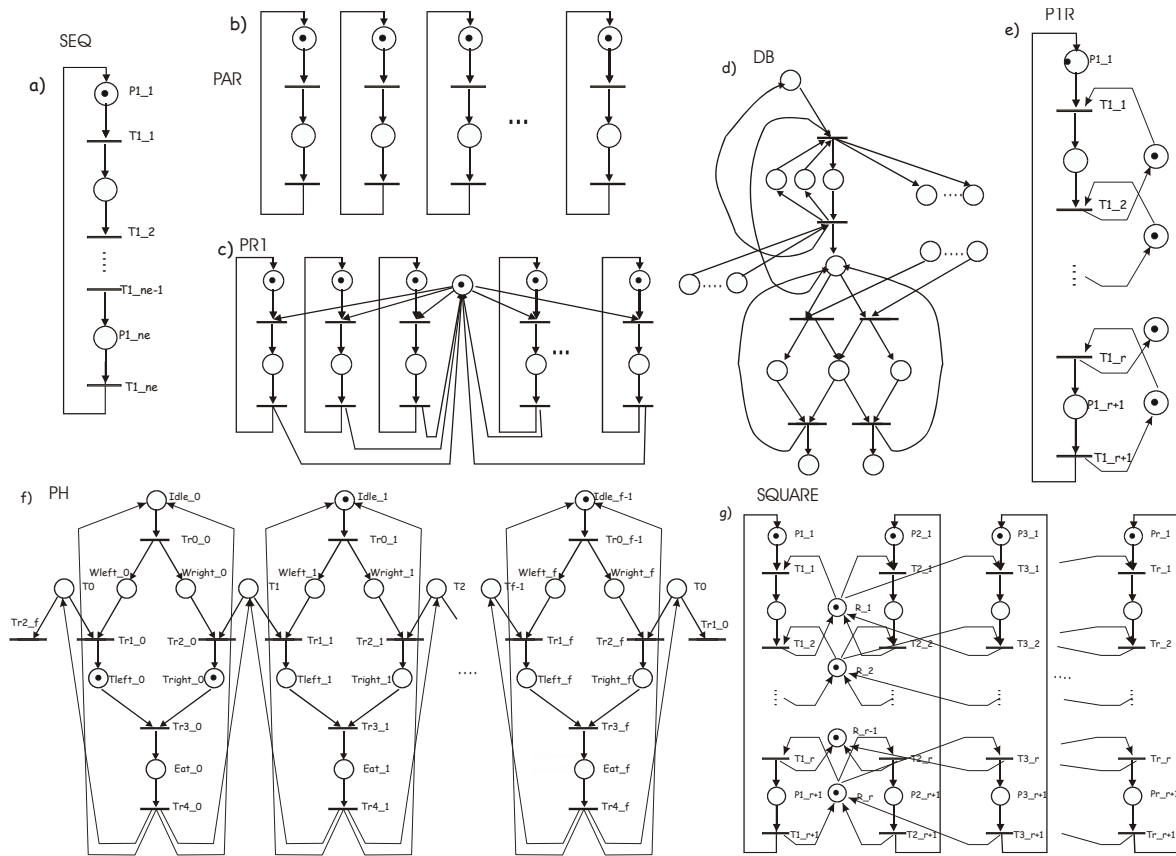


Fig. 1 Perti nets Library

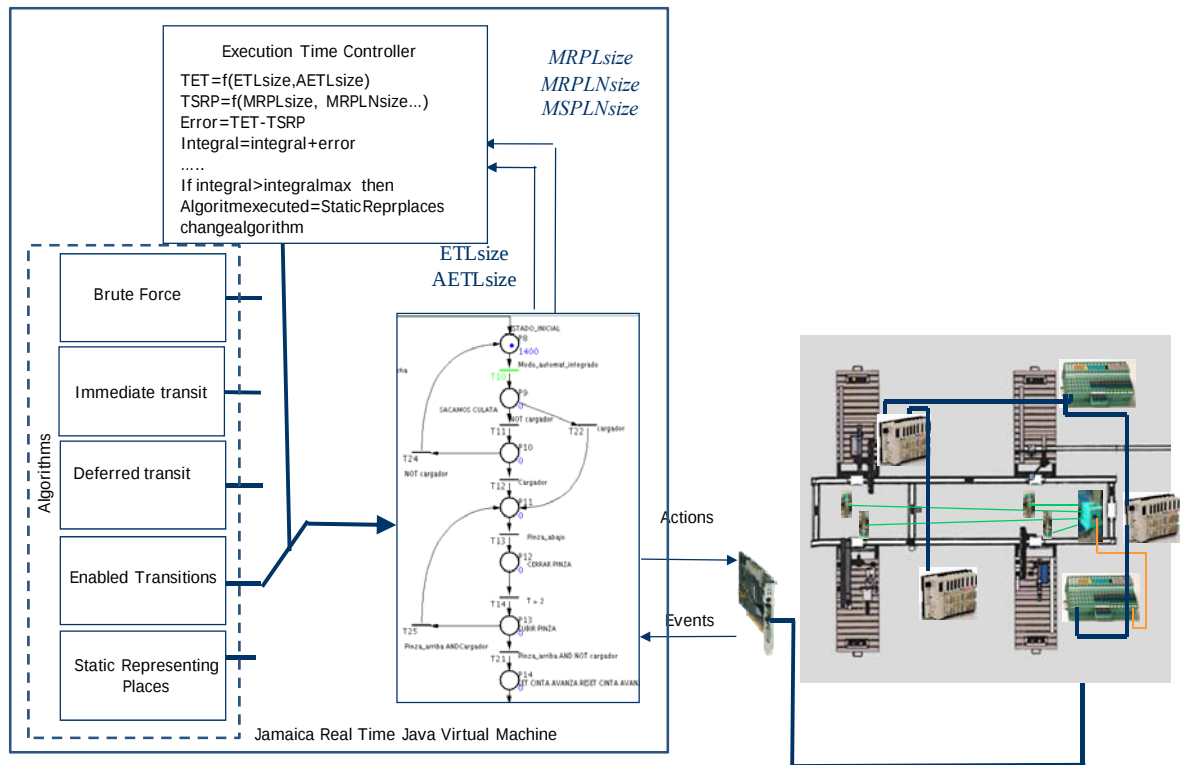


Fig. 2 Execution Time Controller

- *PAR*. Petri Nets with p (1..100) sequential processes with 2 places

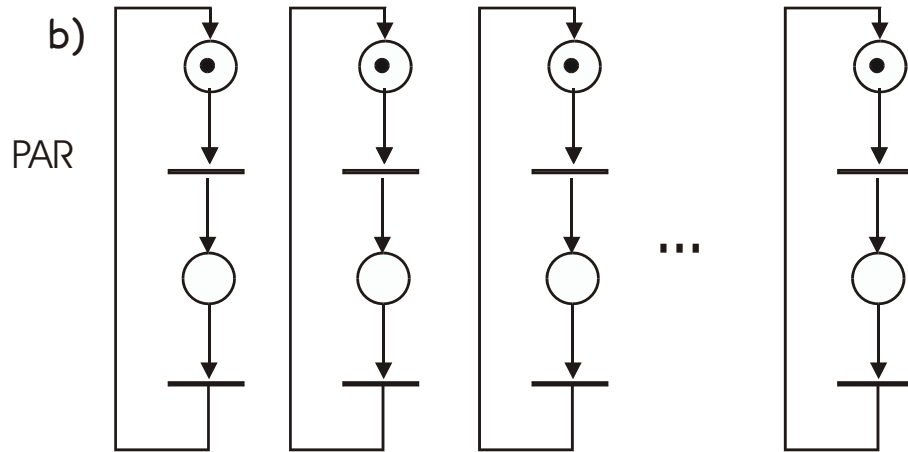


Fig. 3 Par nets

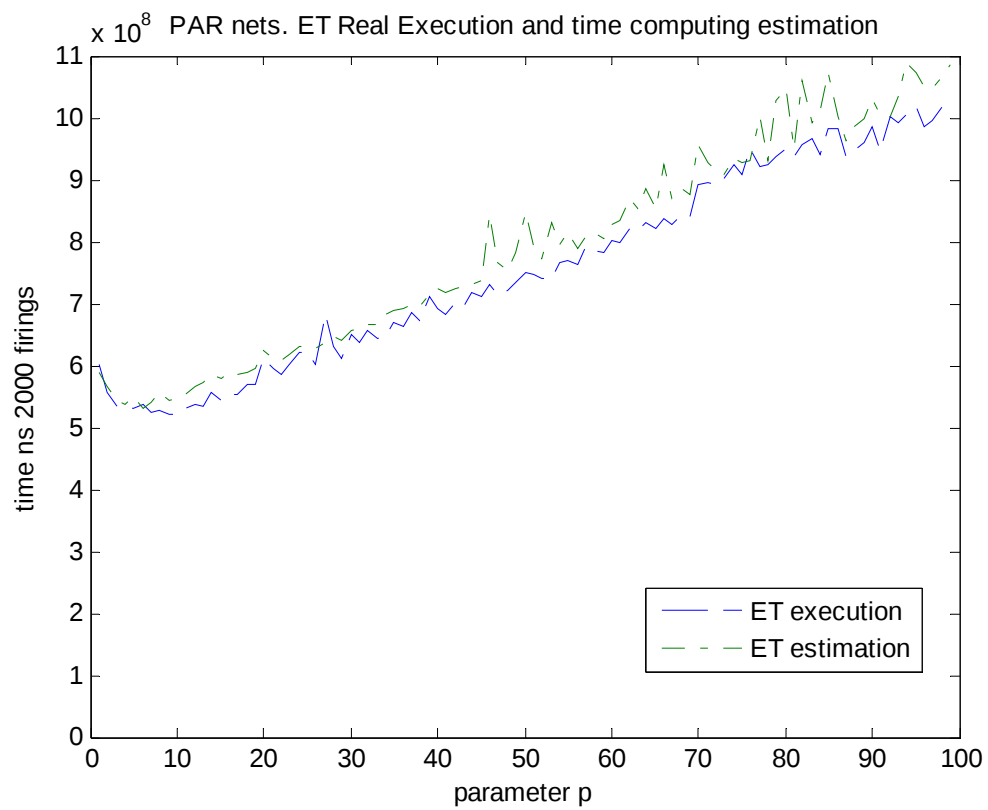
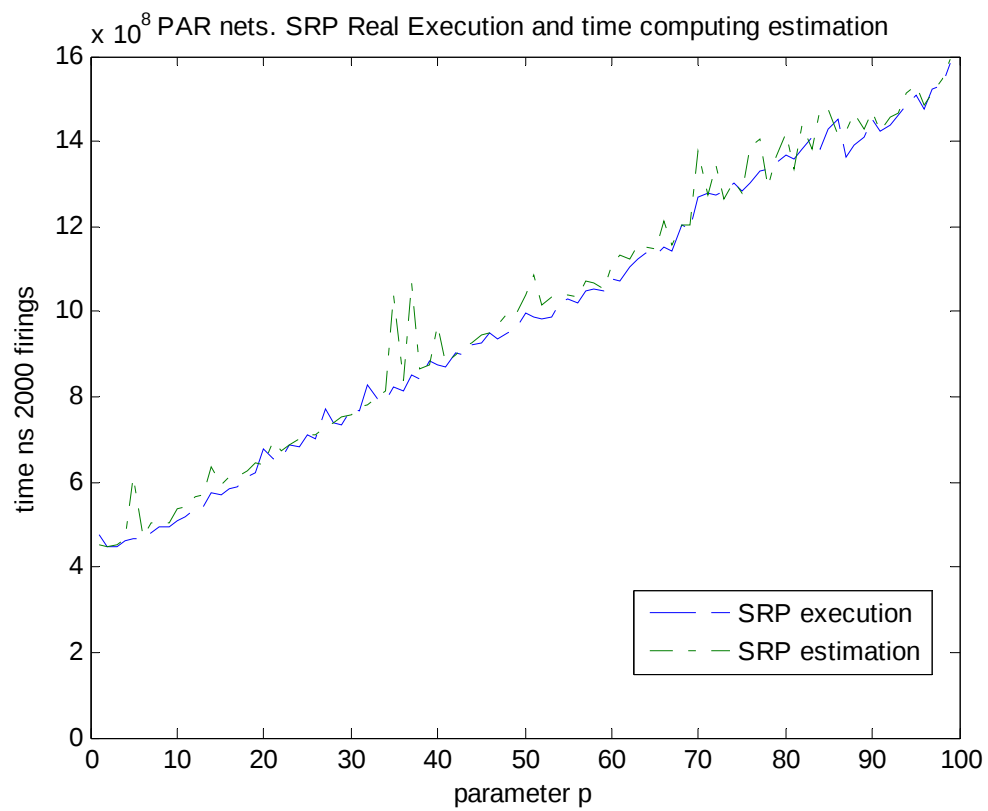
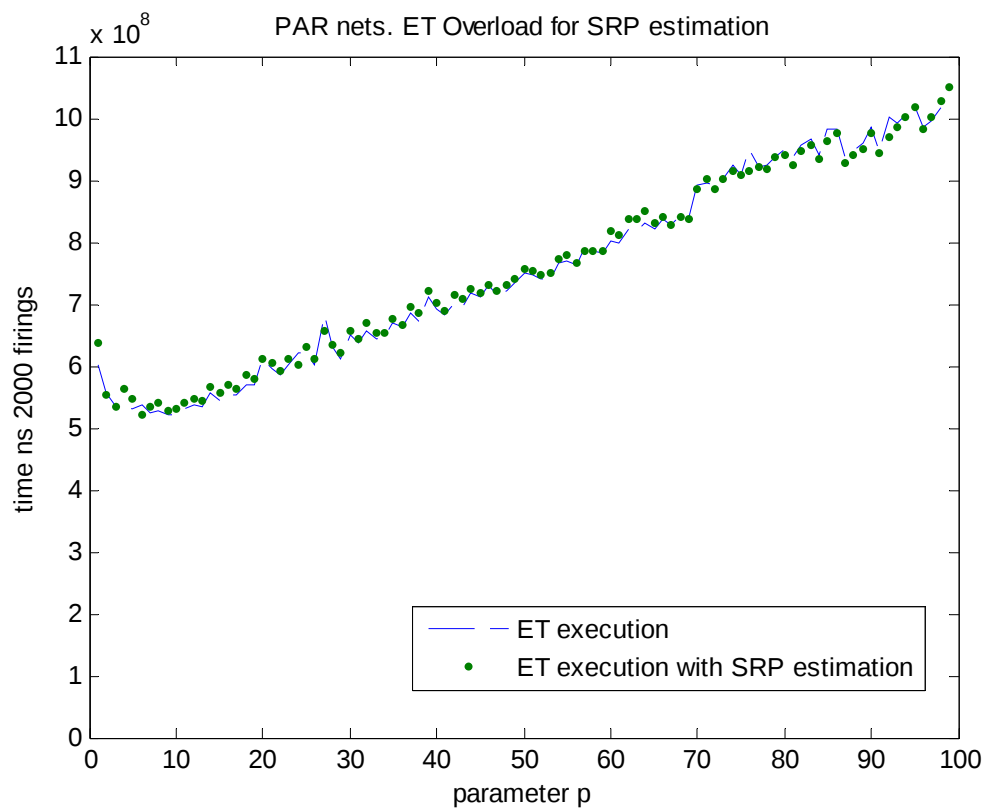
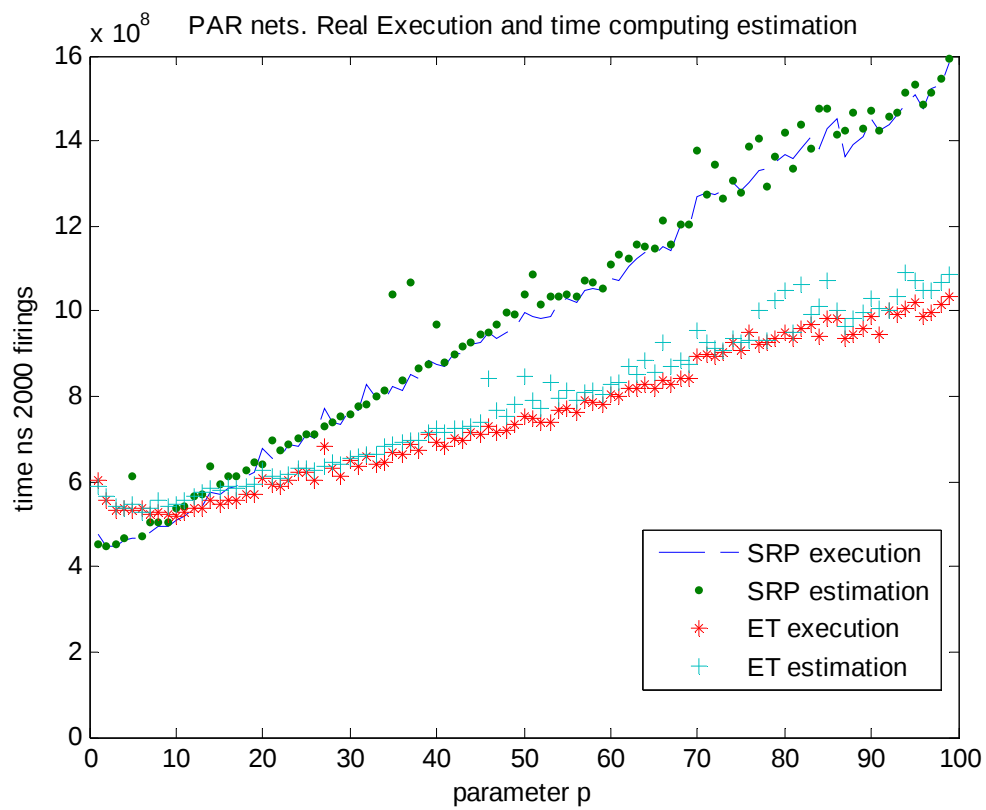
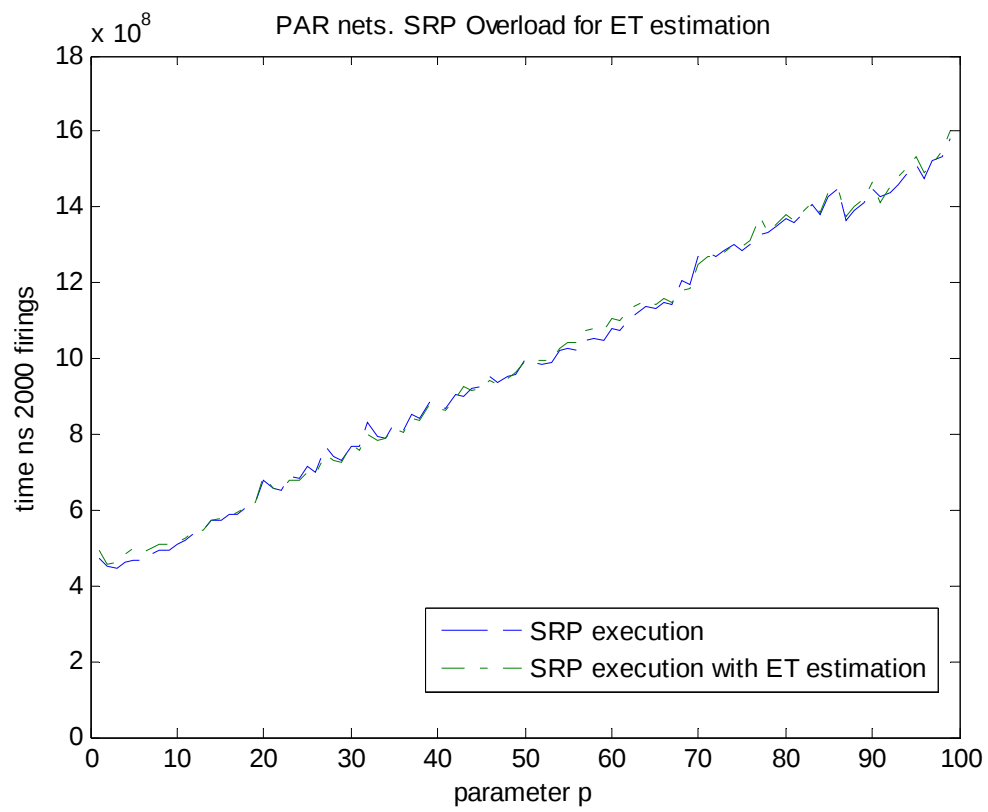
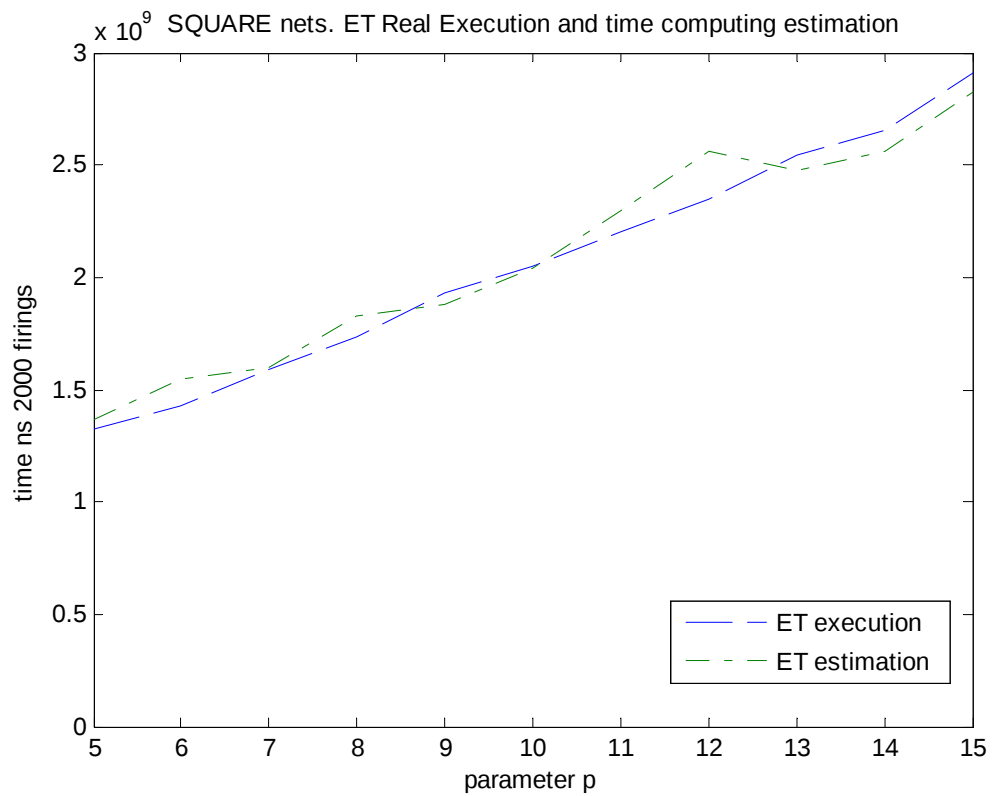
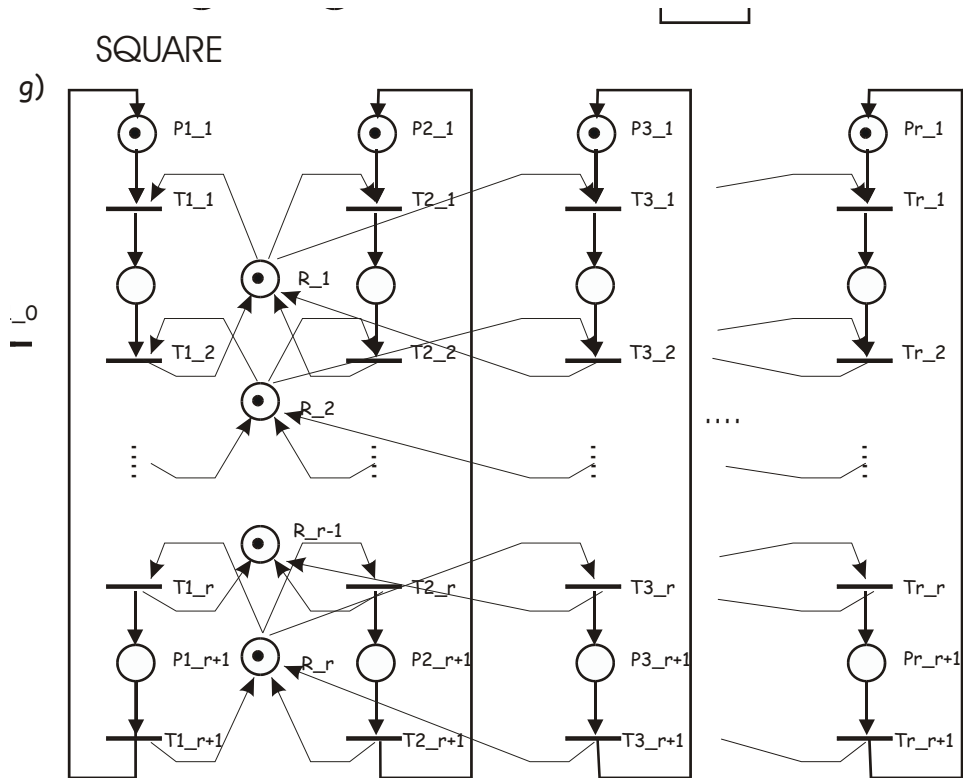


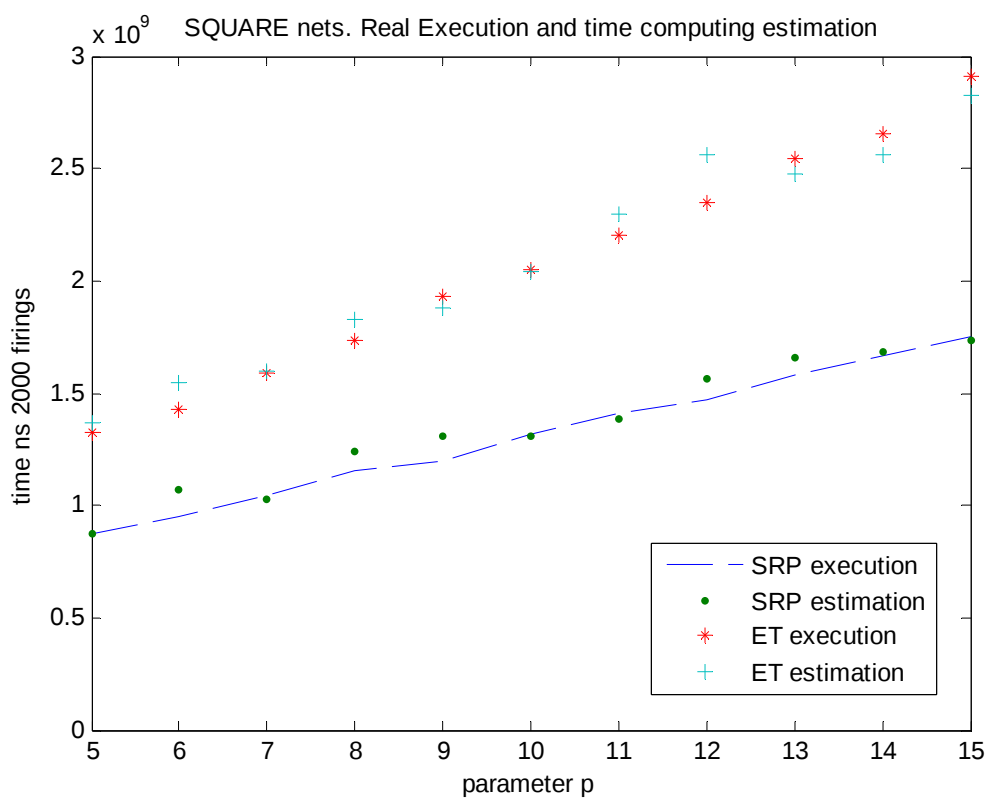
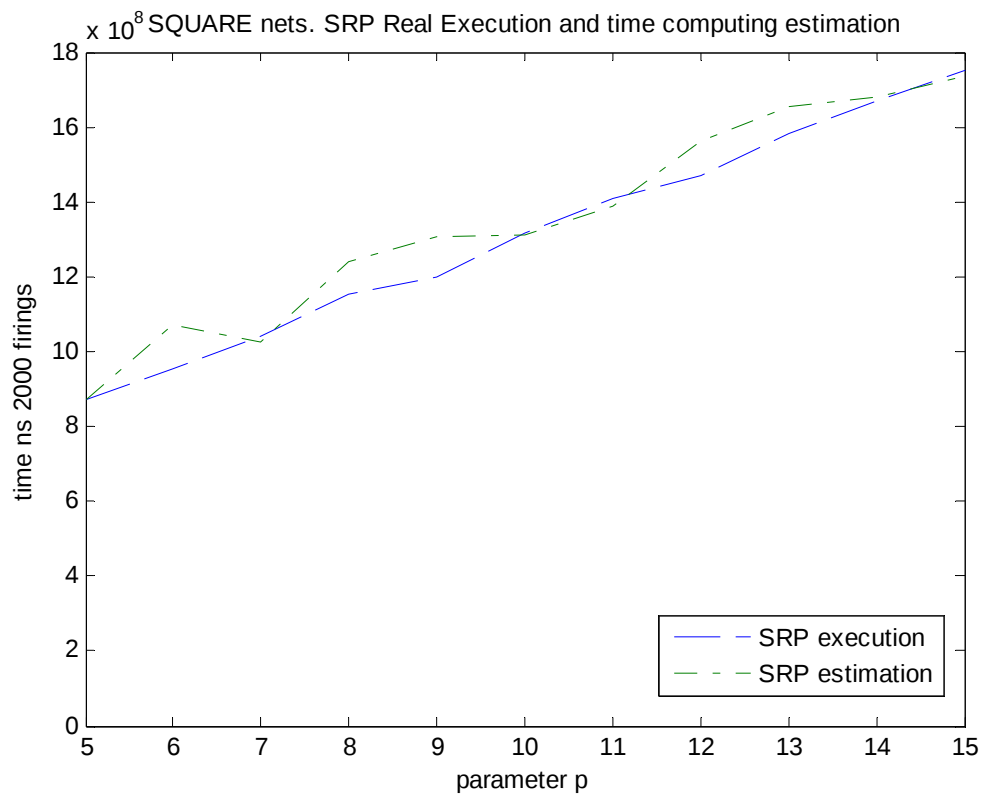
Fig. 4

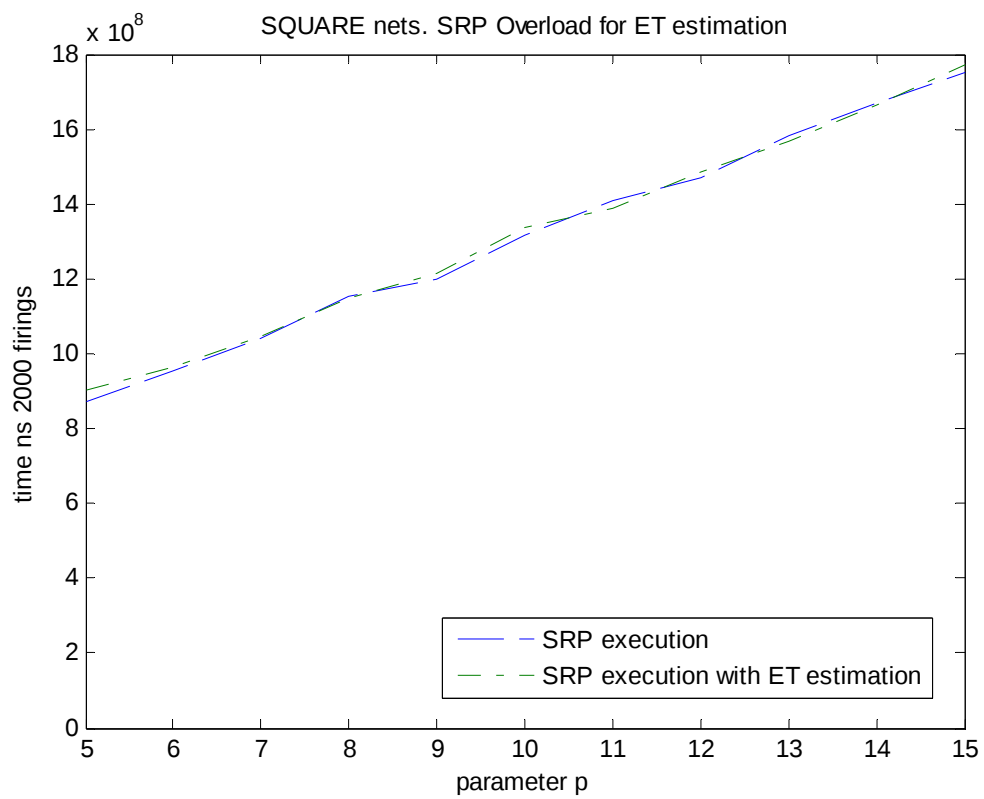
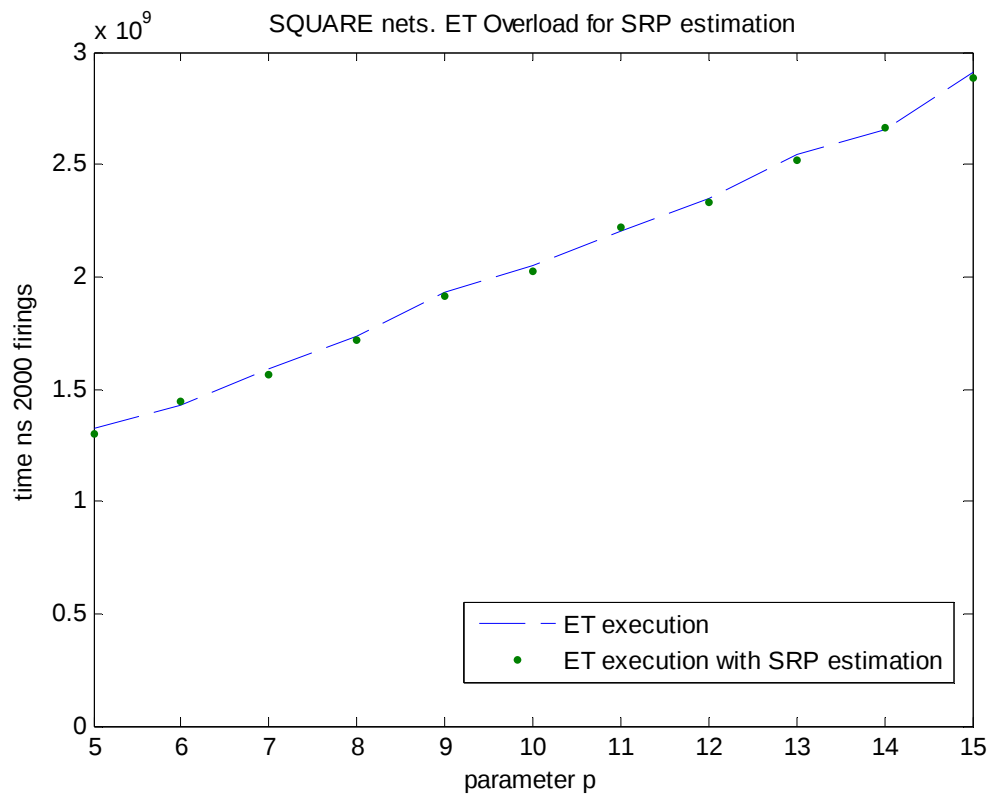


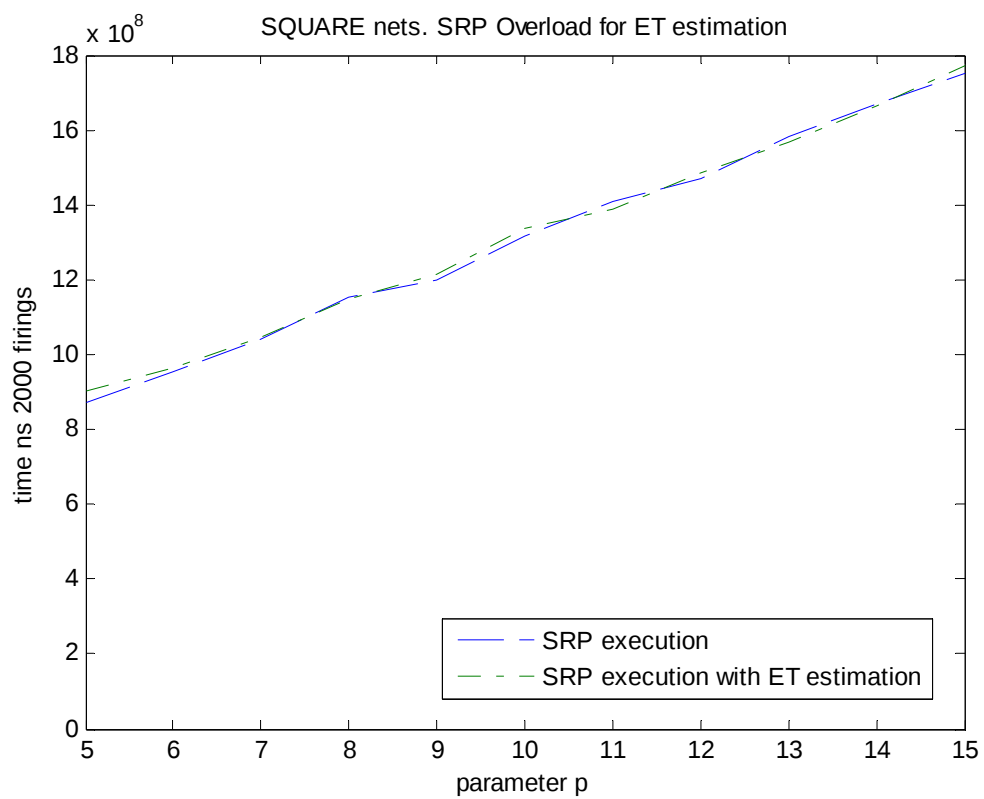


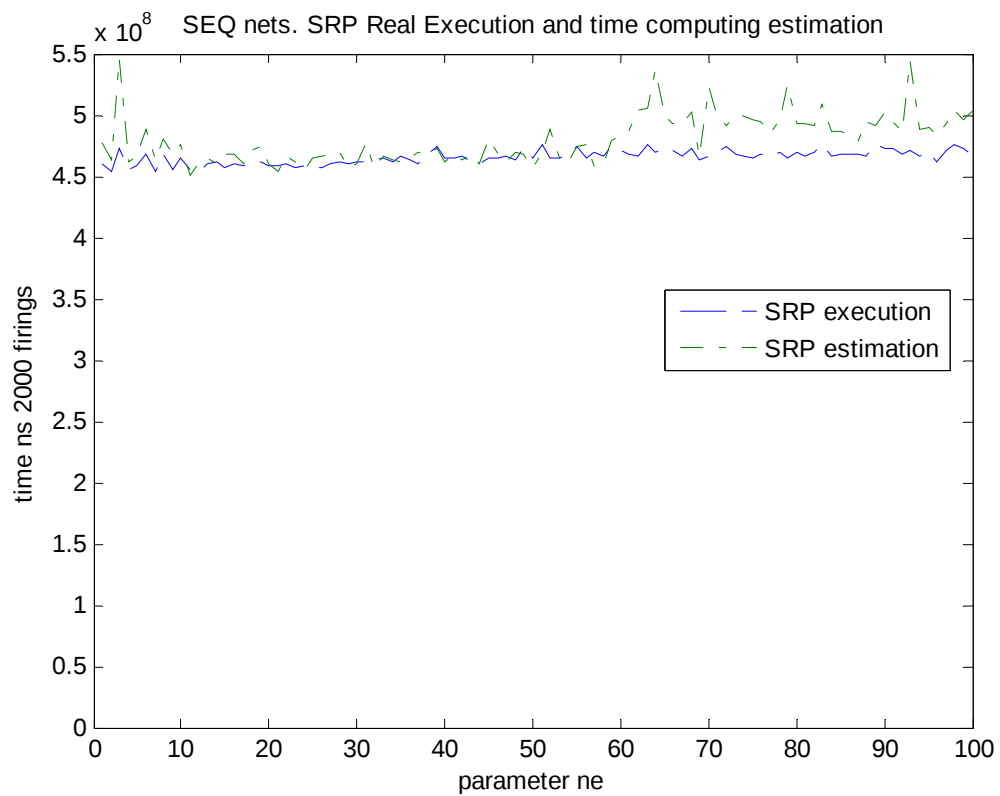
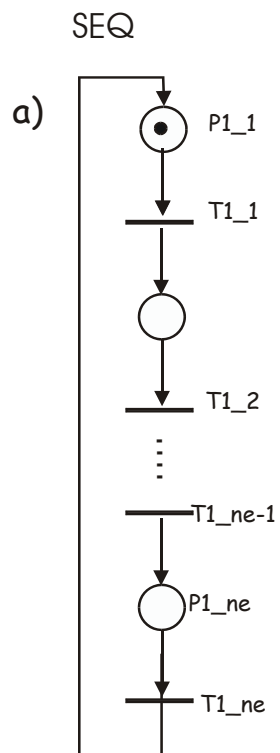


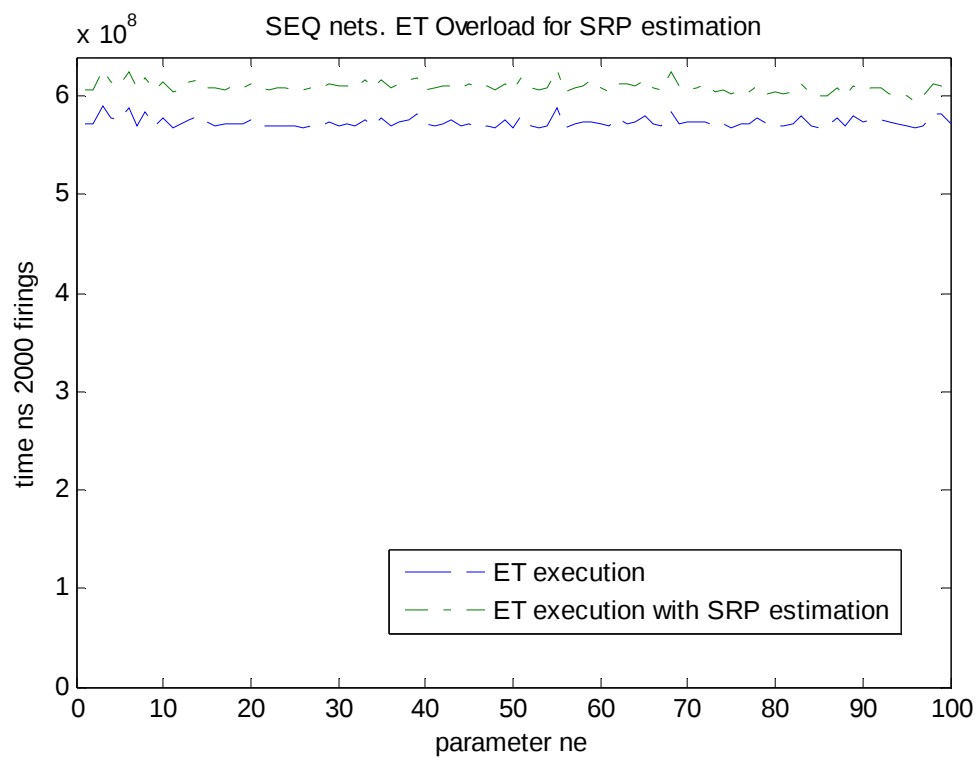
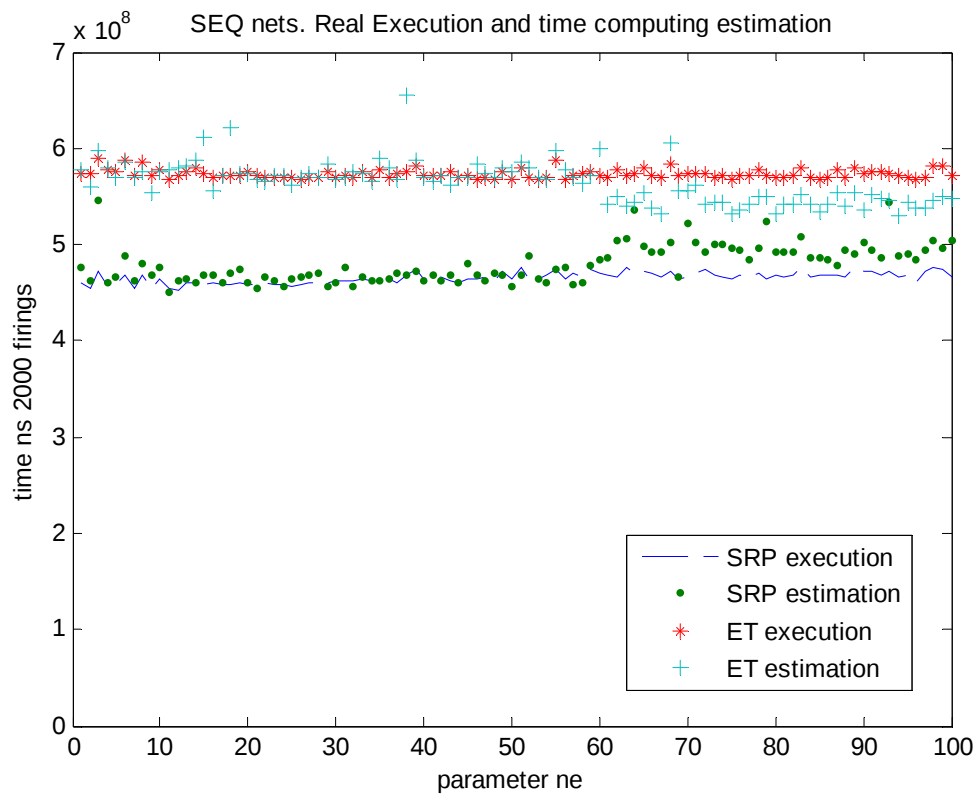


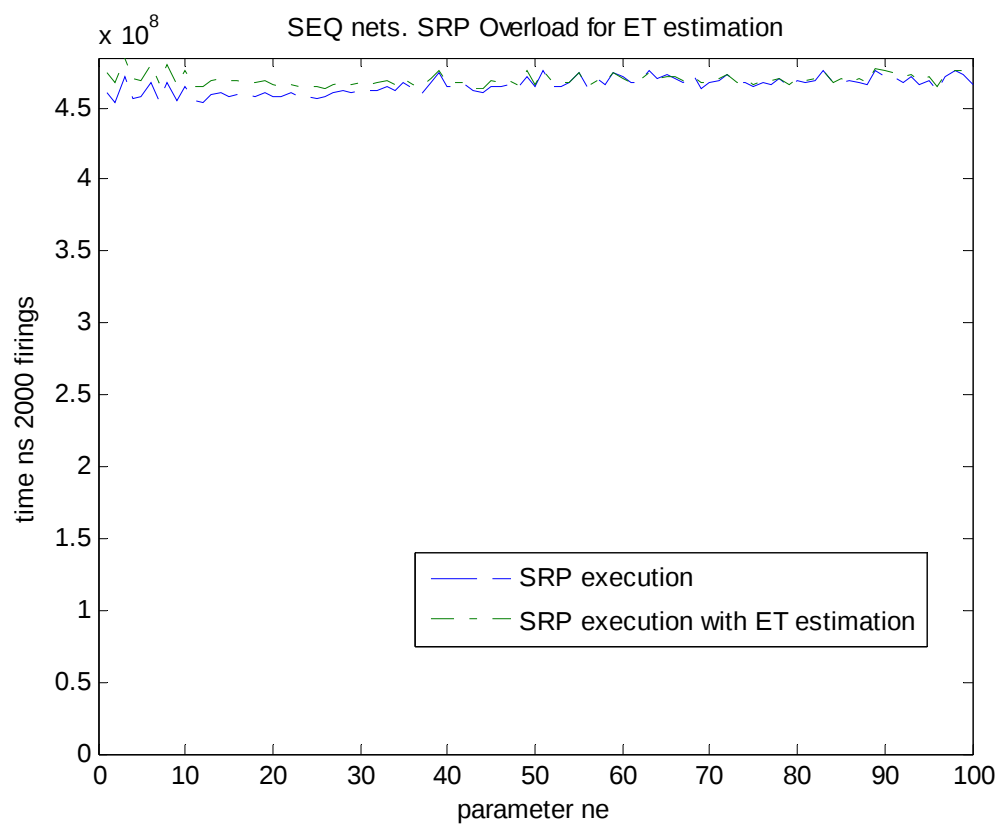


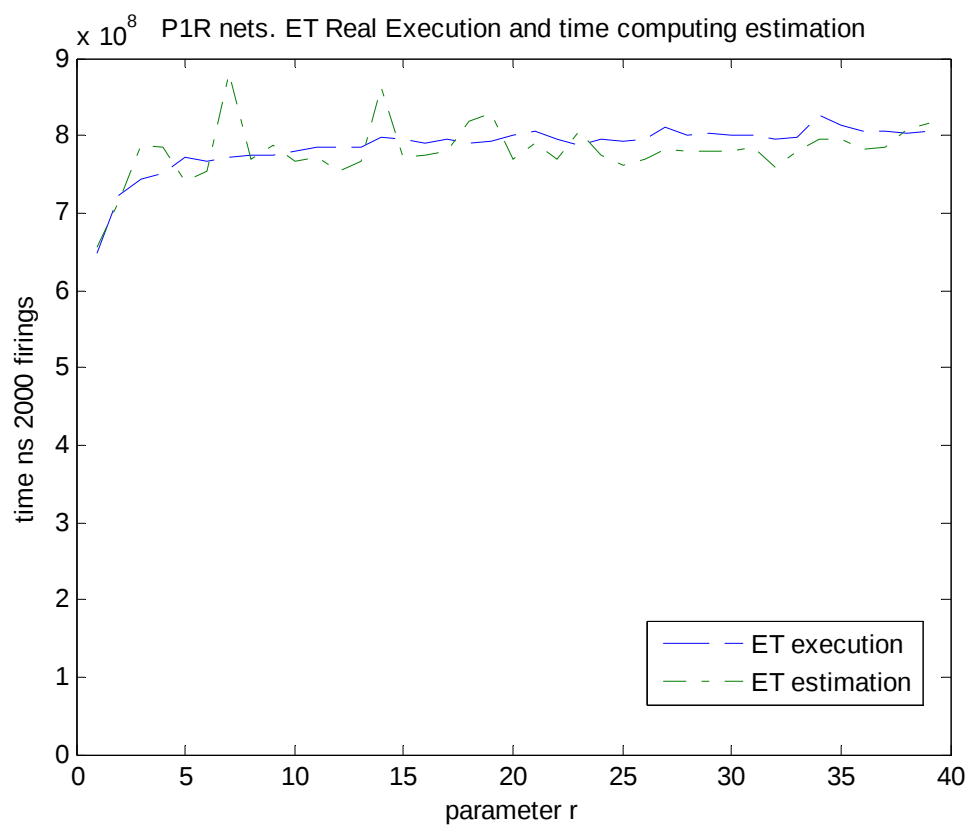
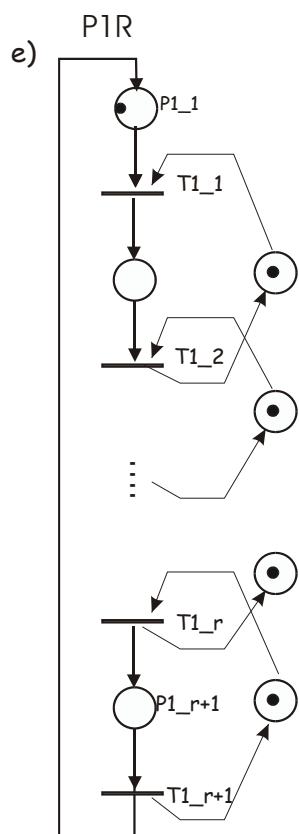


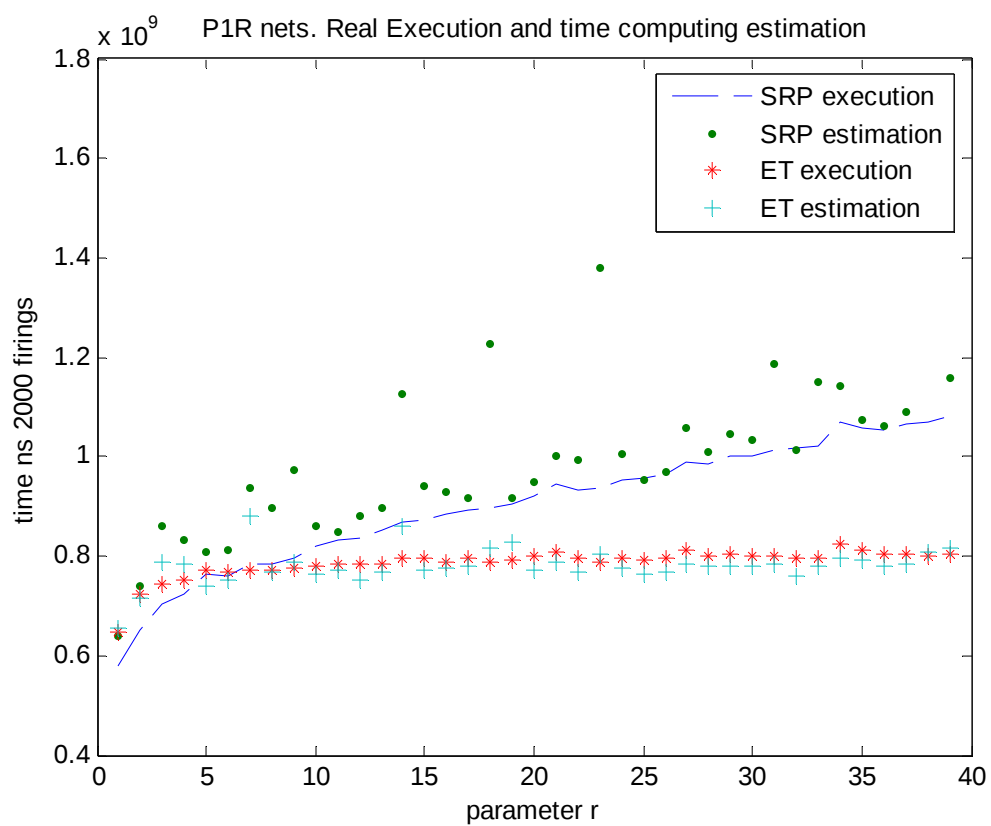
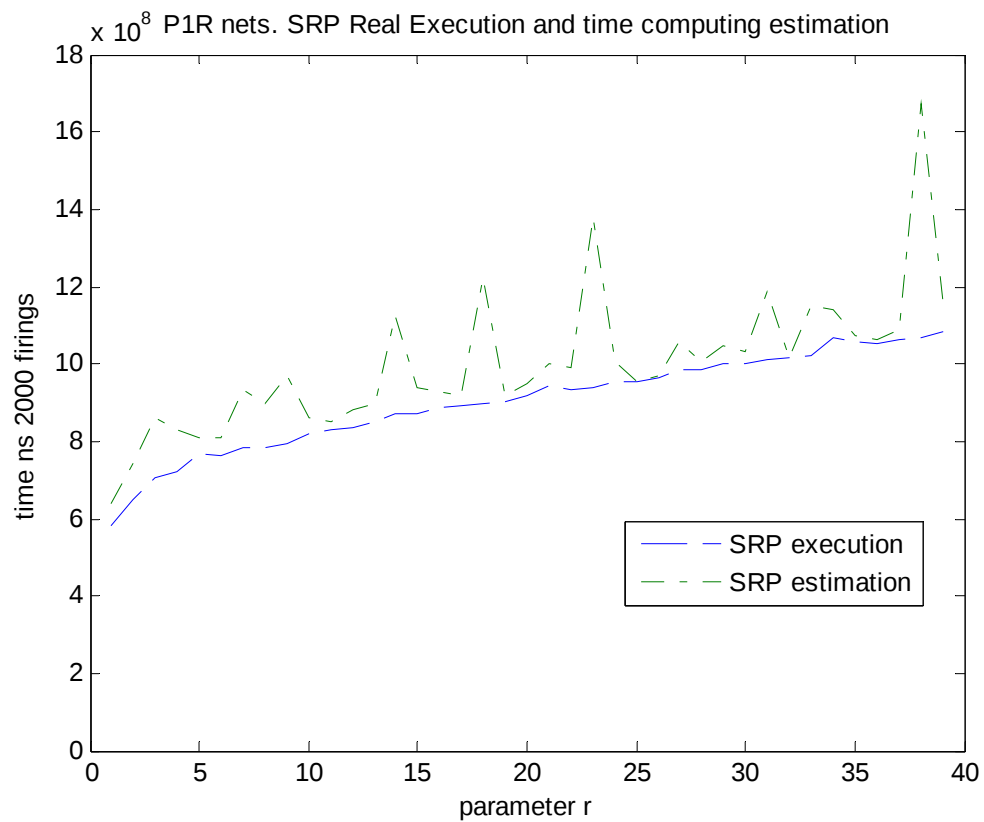


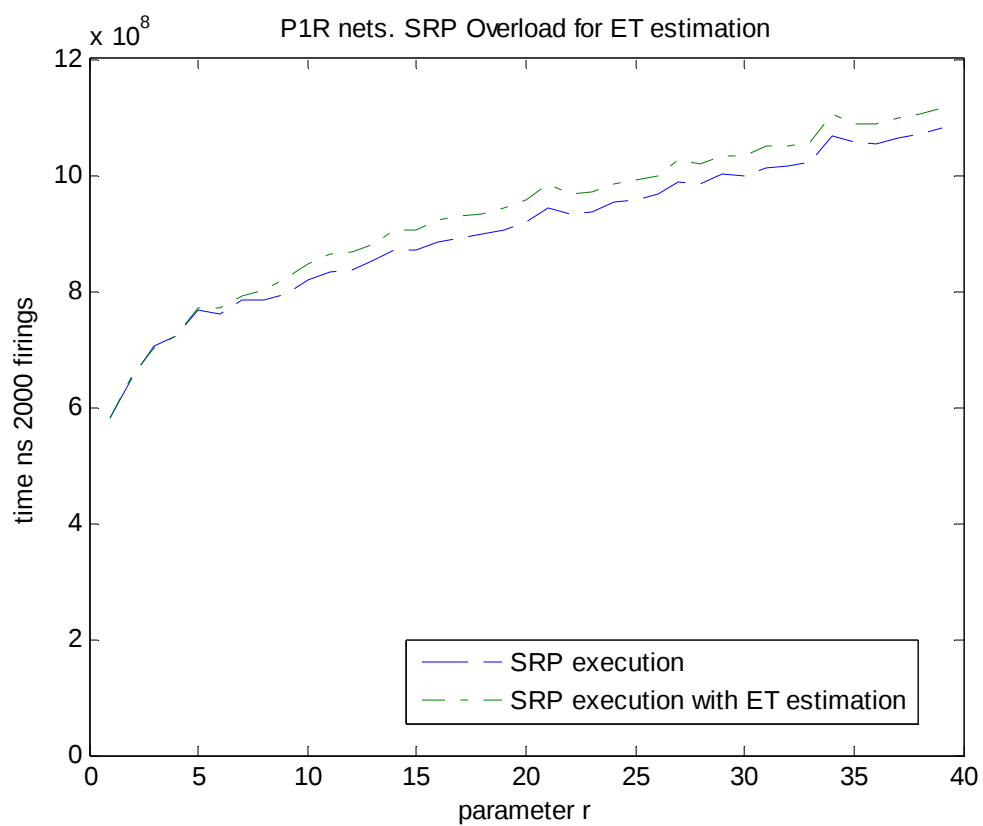
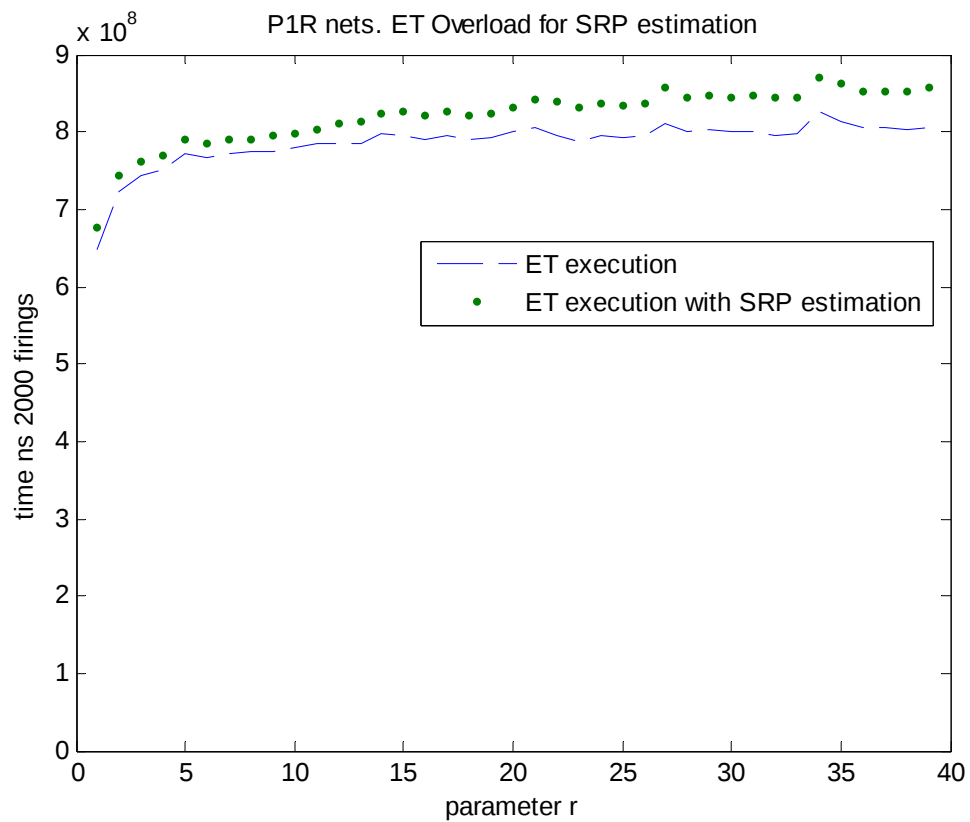


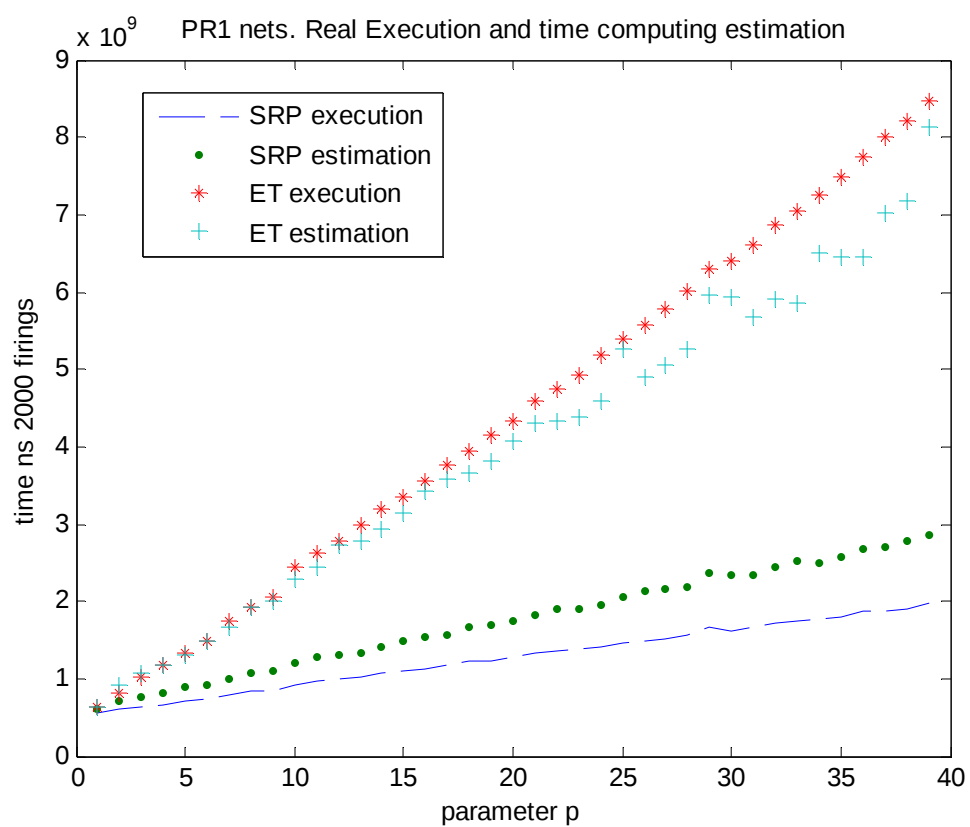
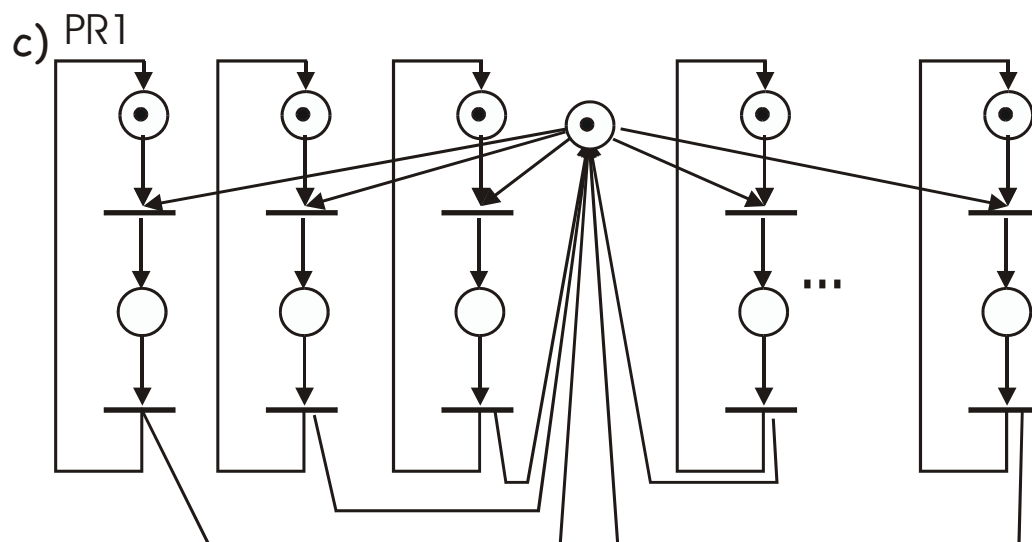


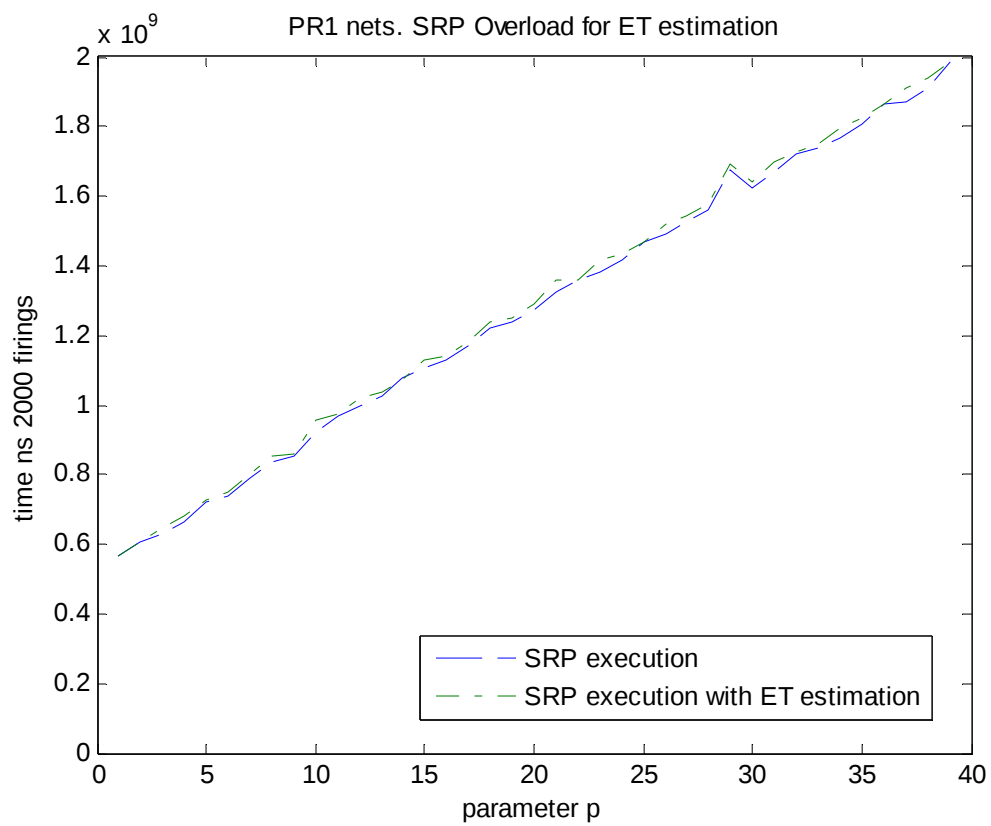
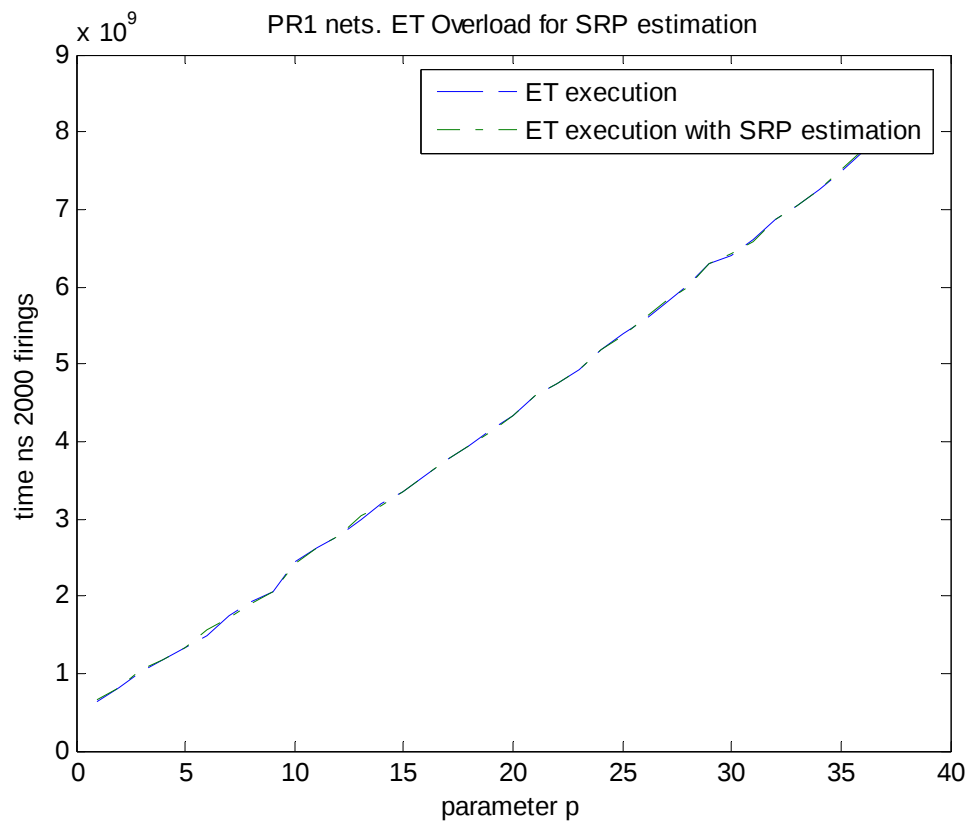


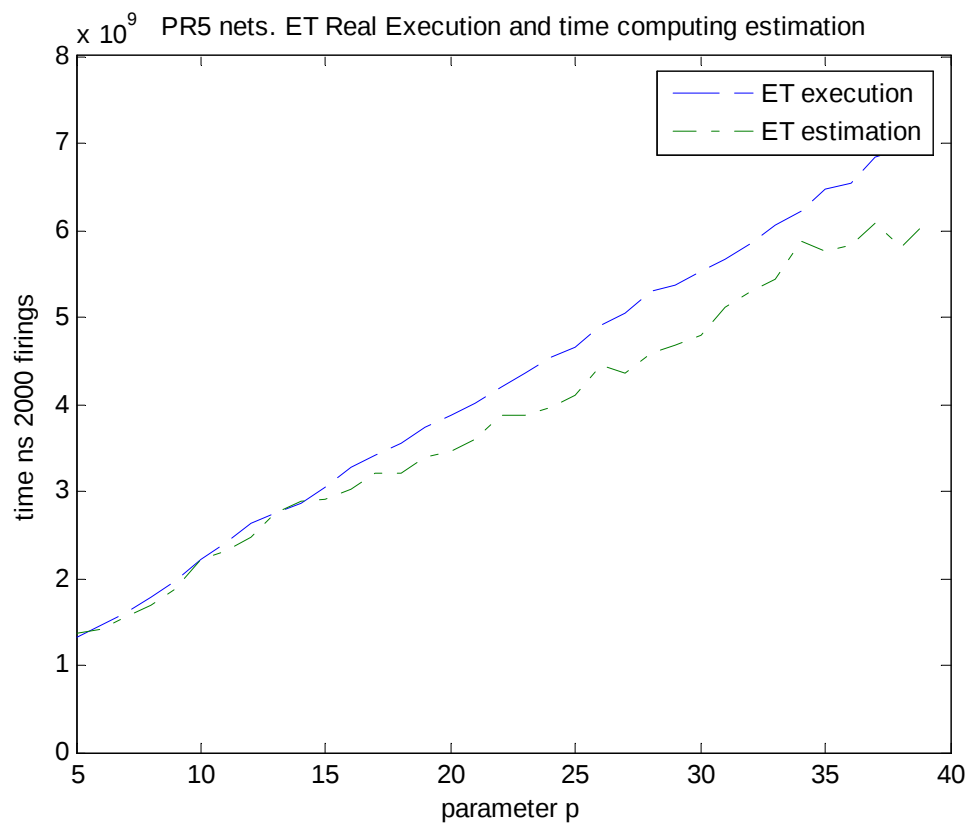
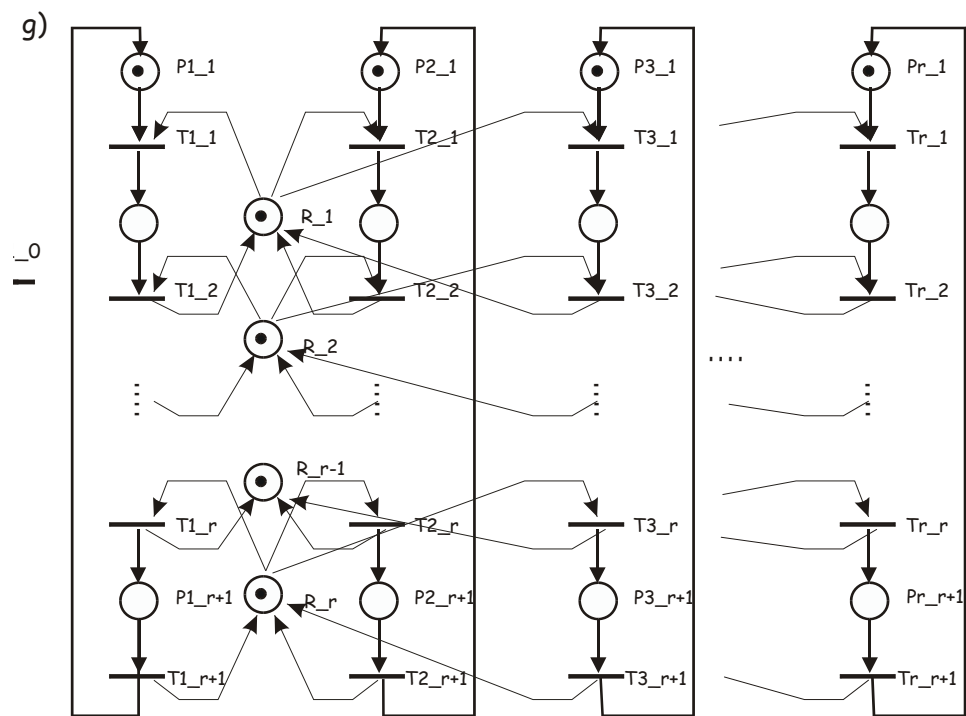


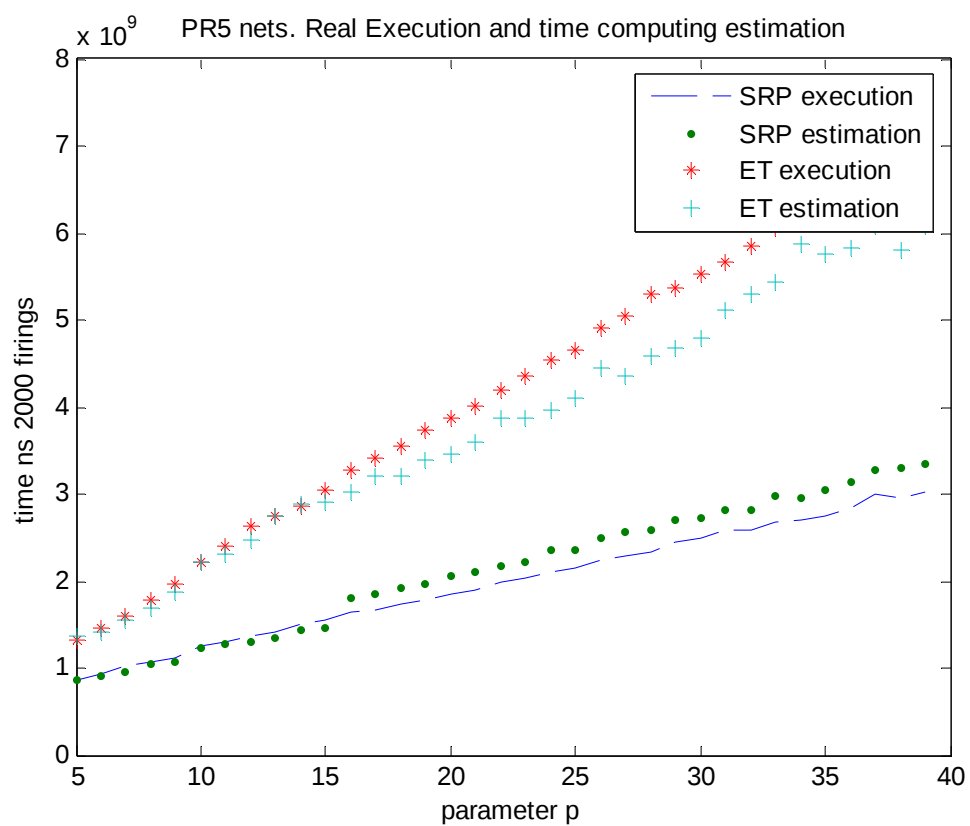
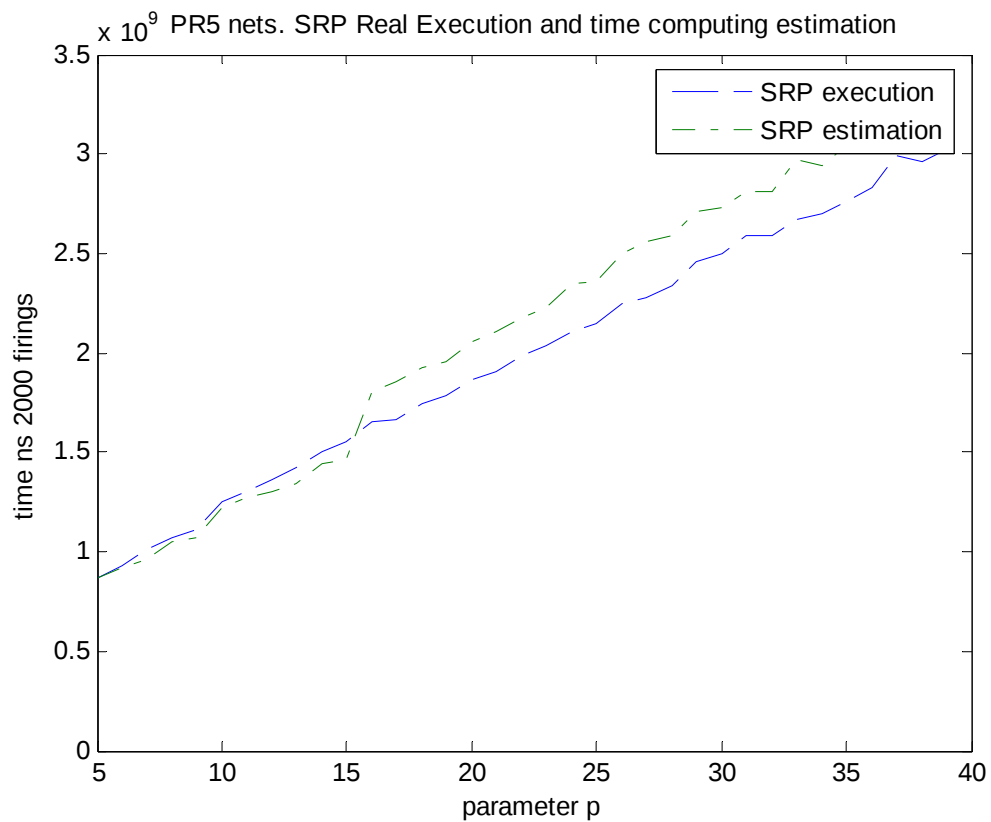


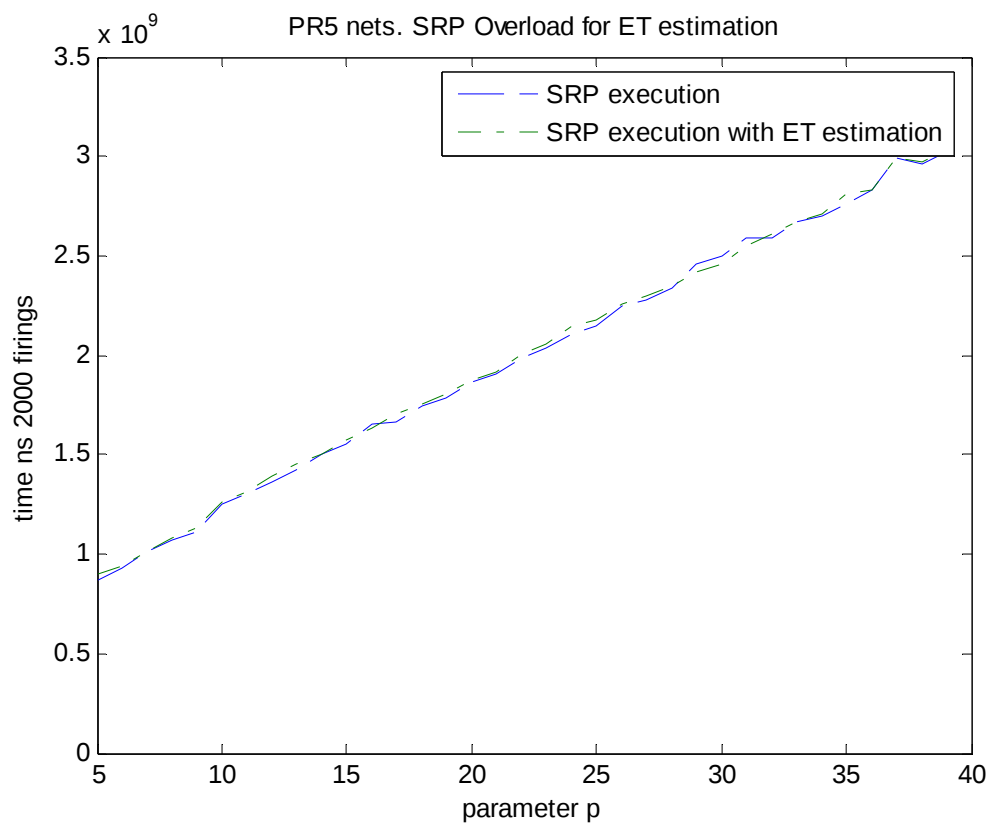
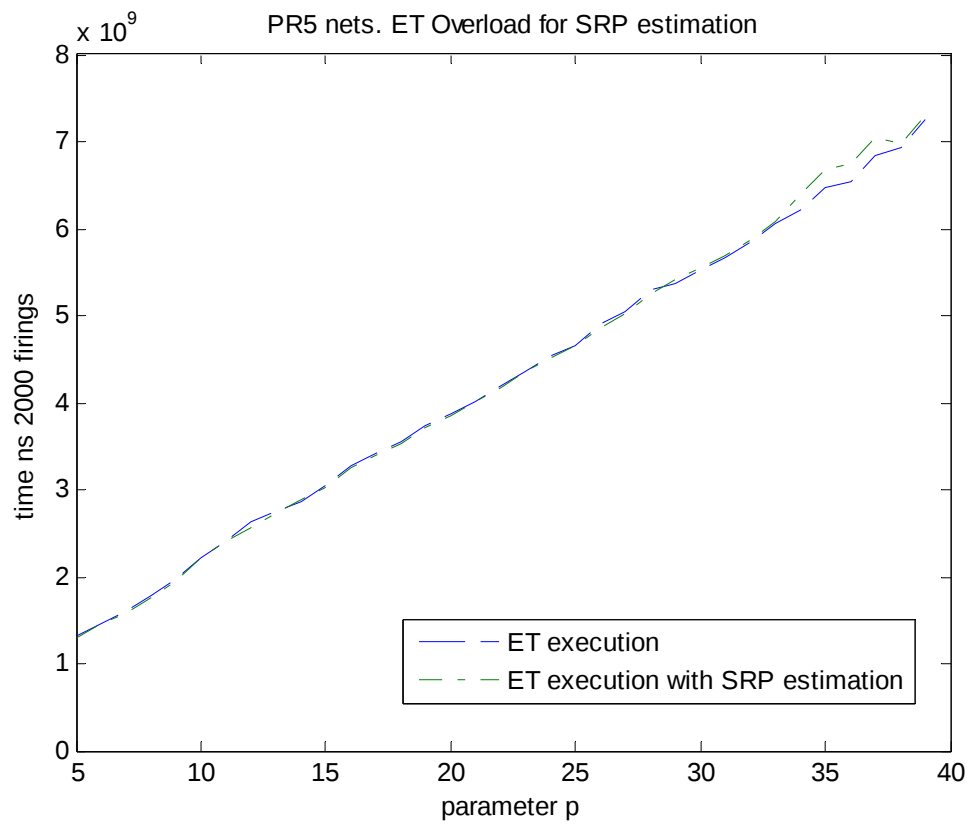


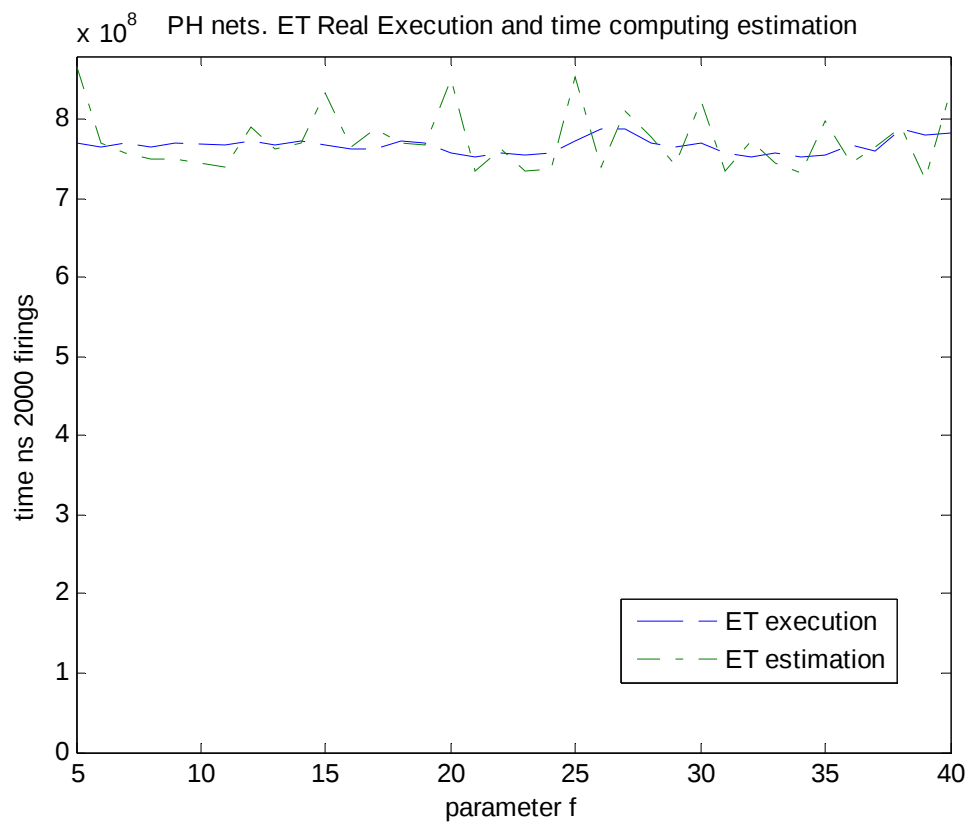
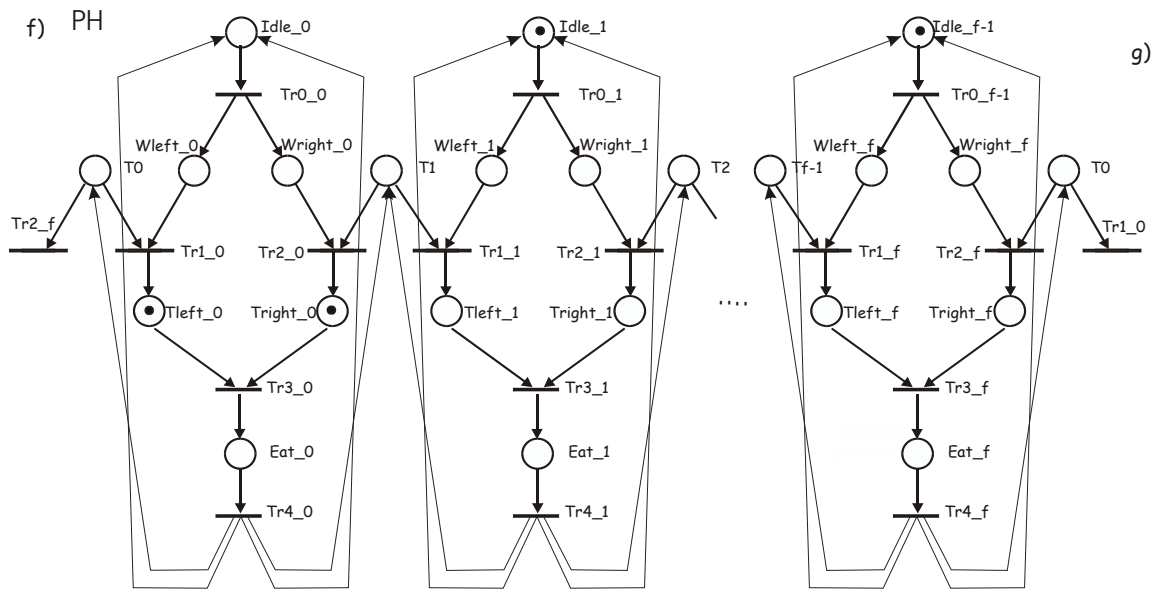


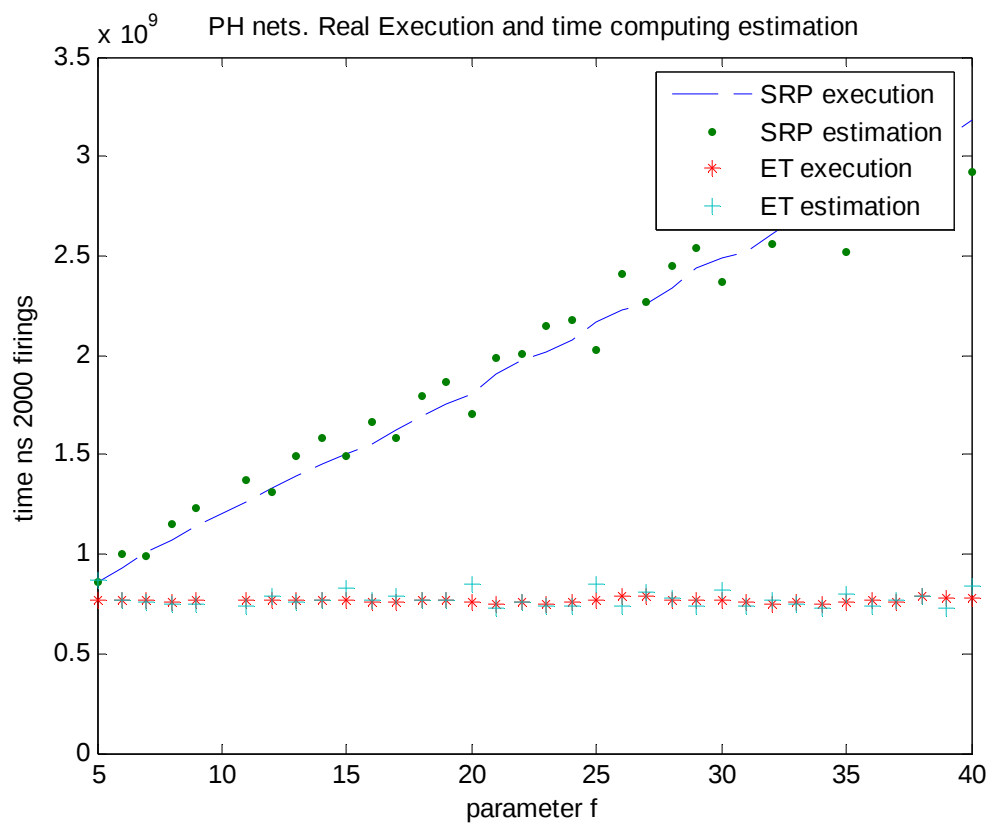
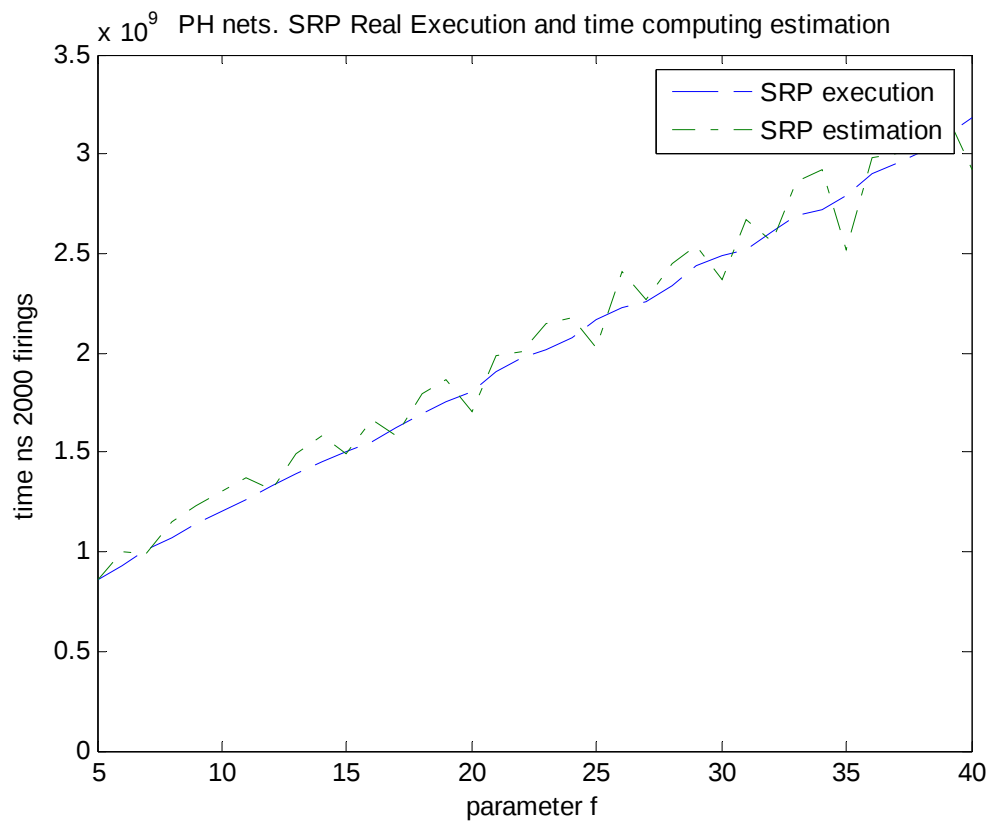


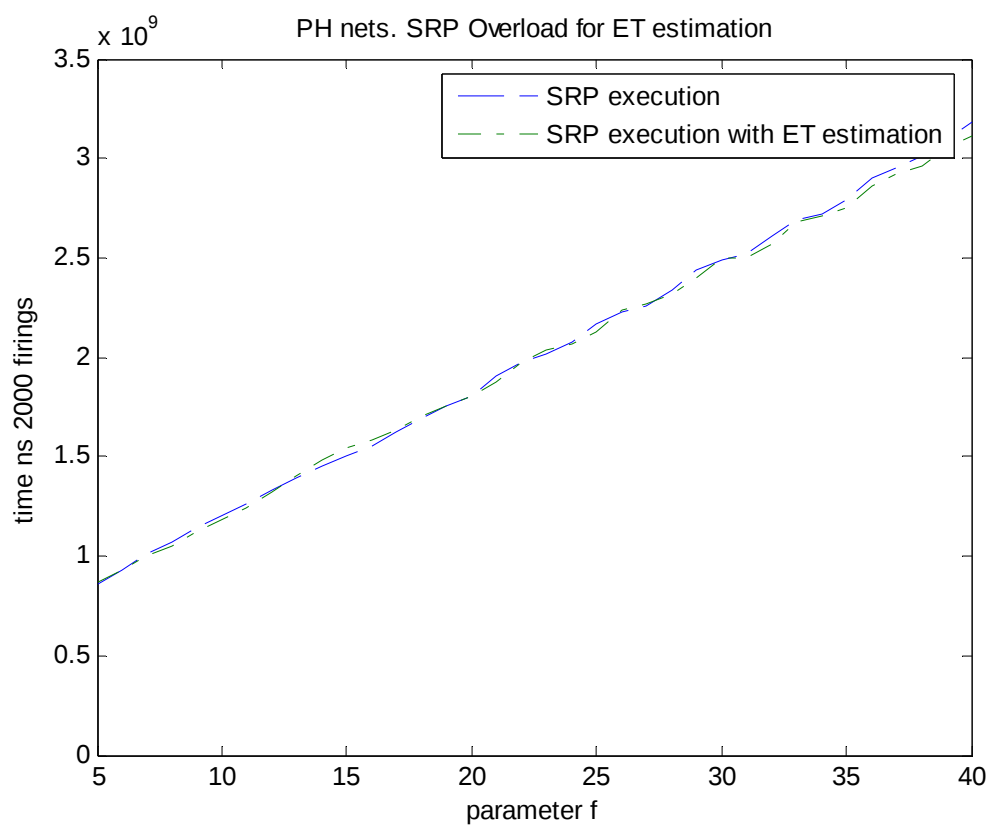
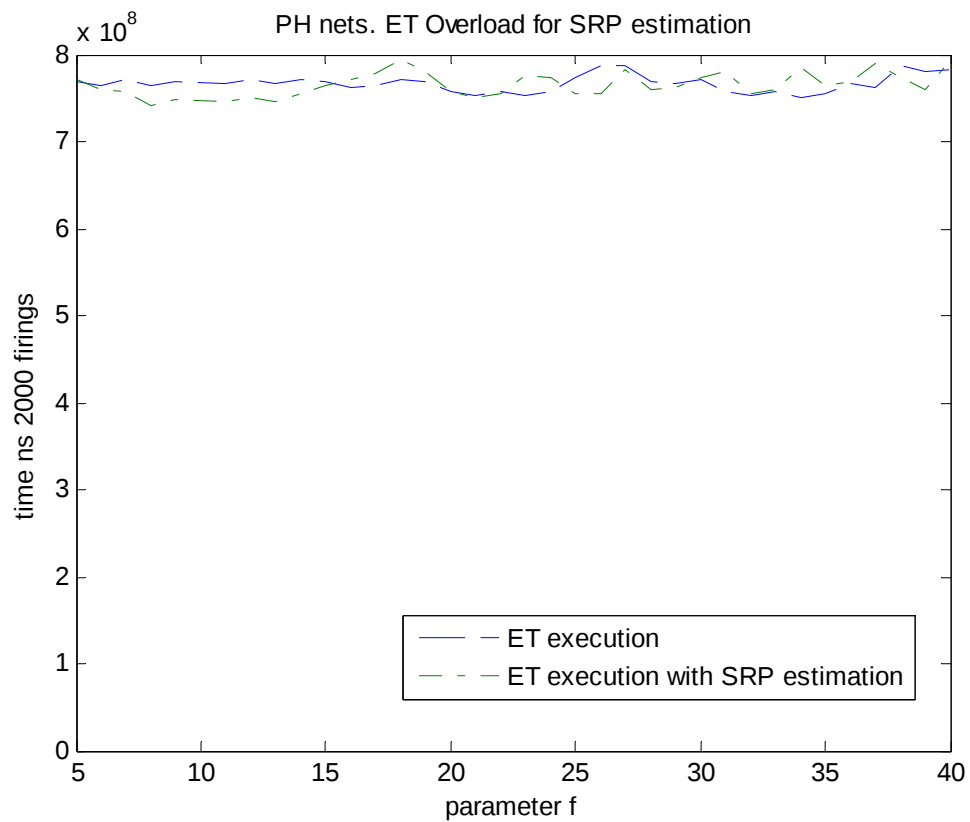


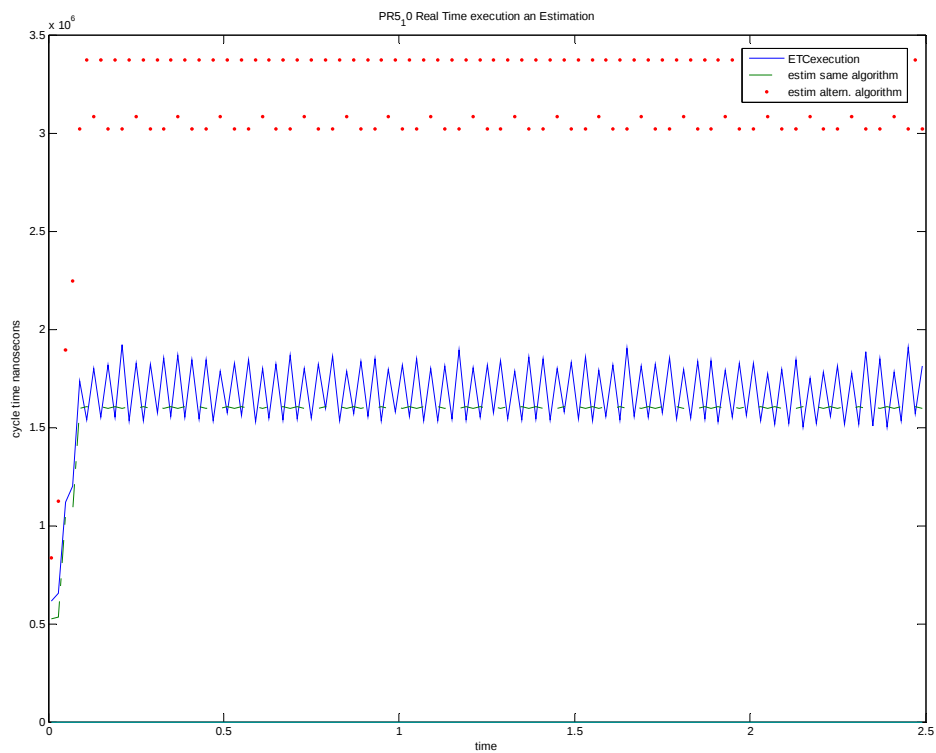
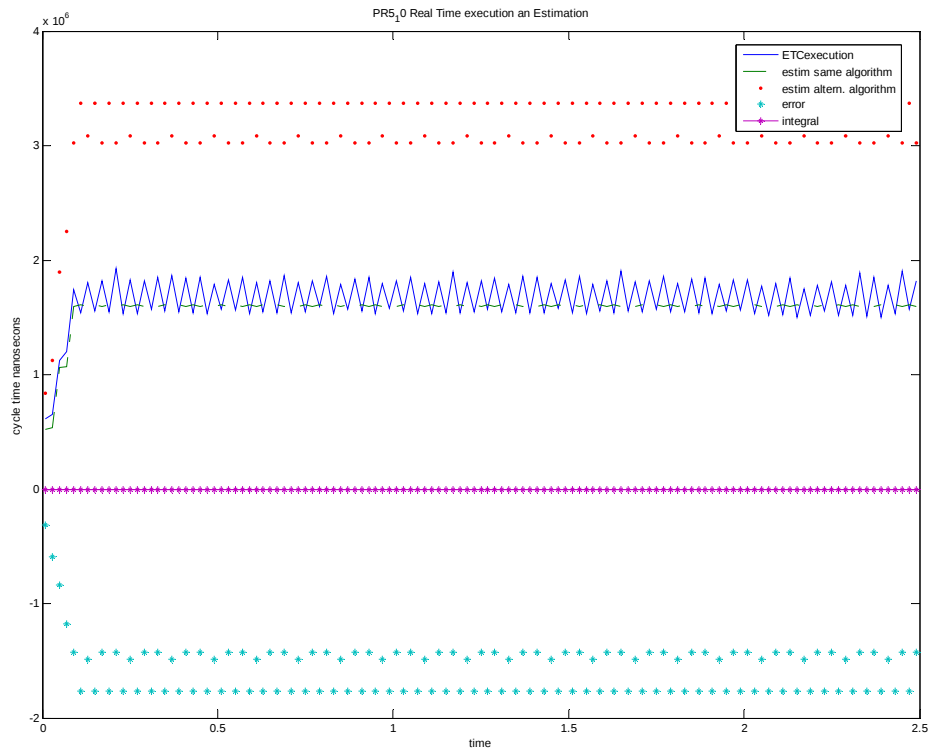


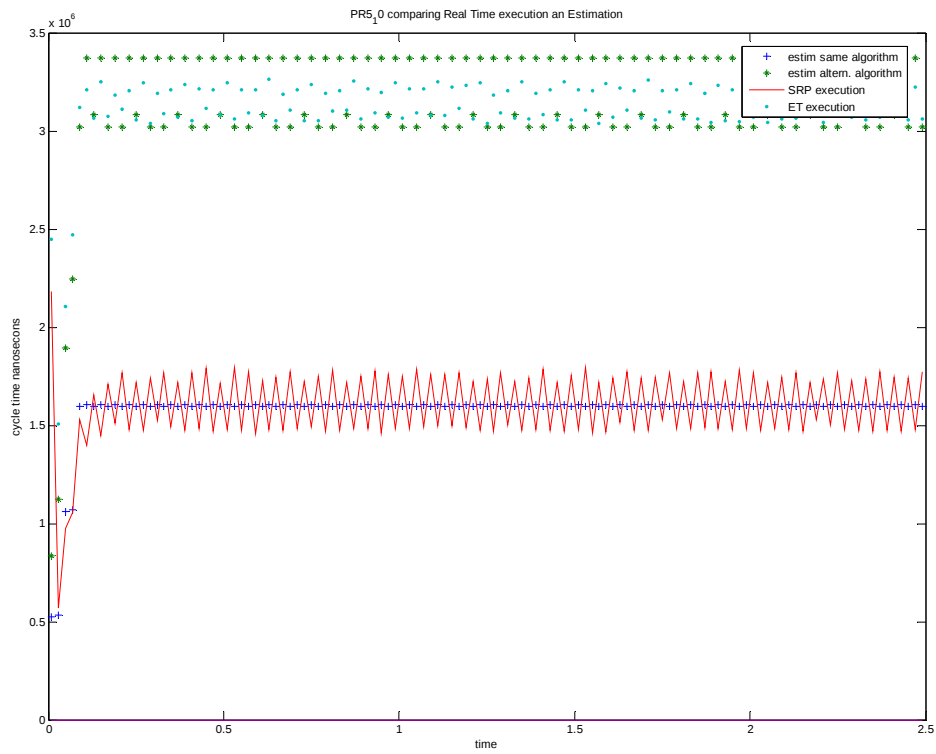
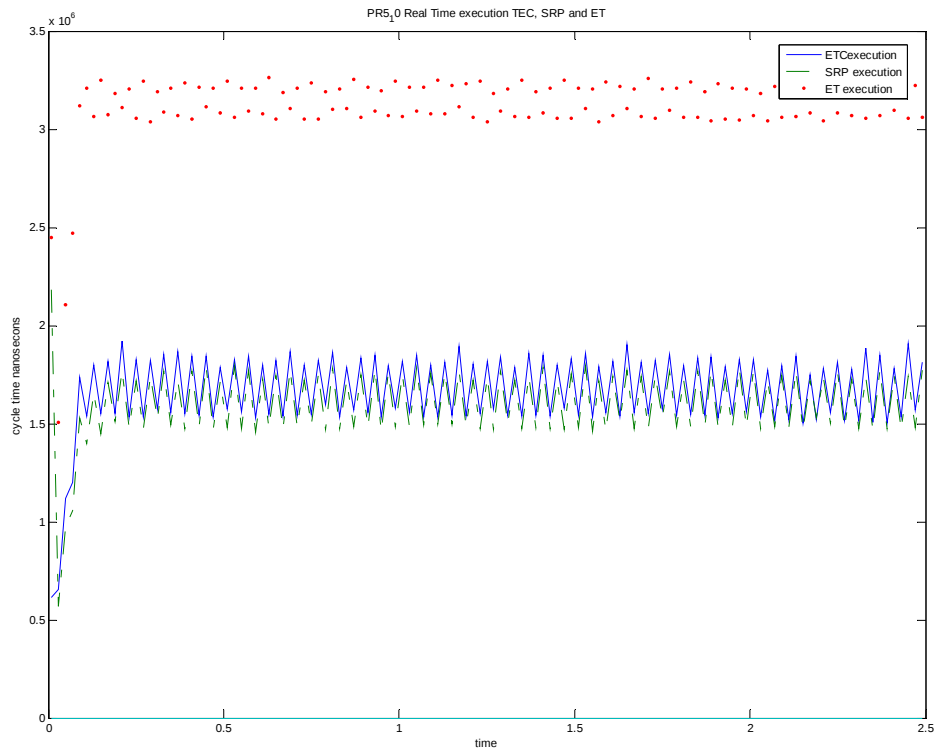


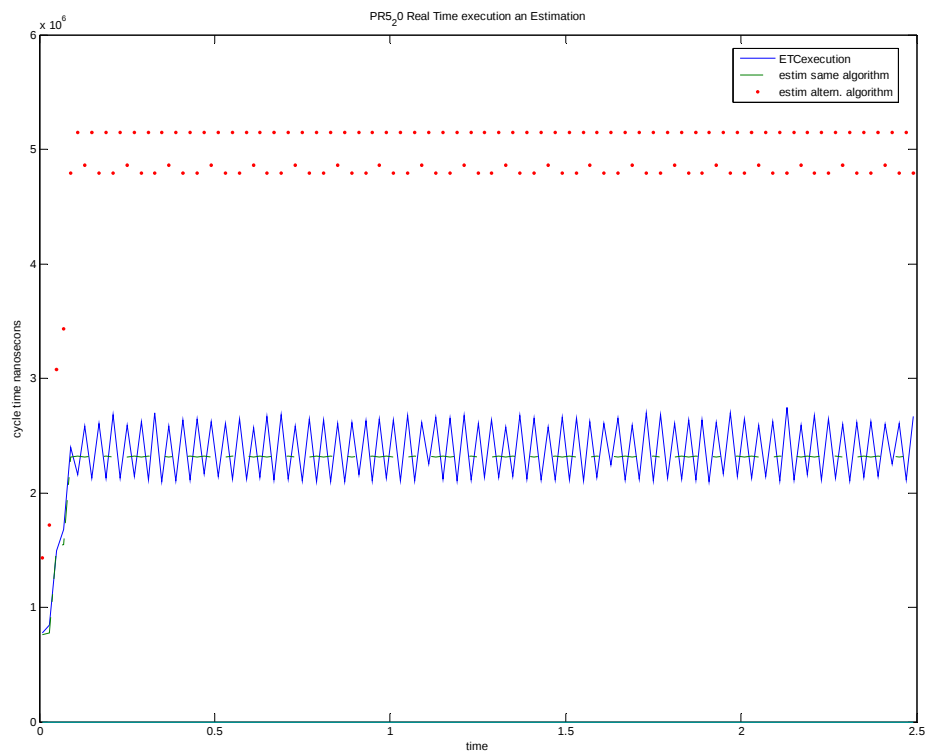
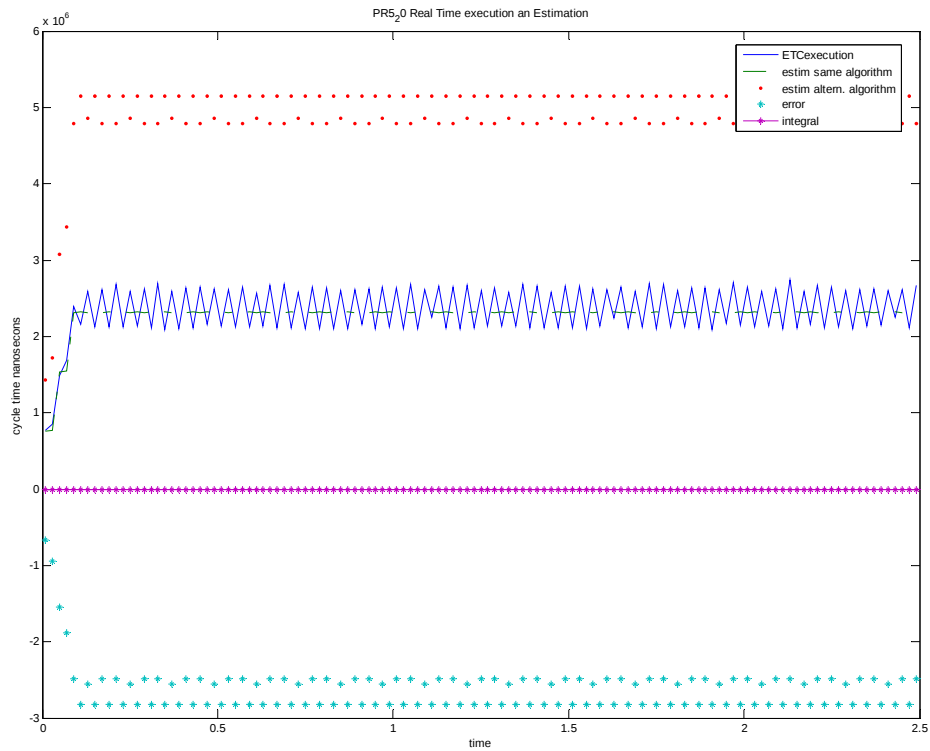


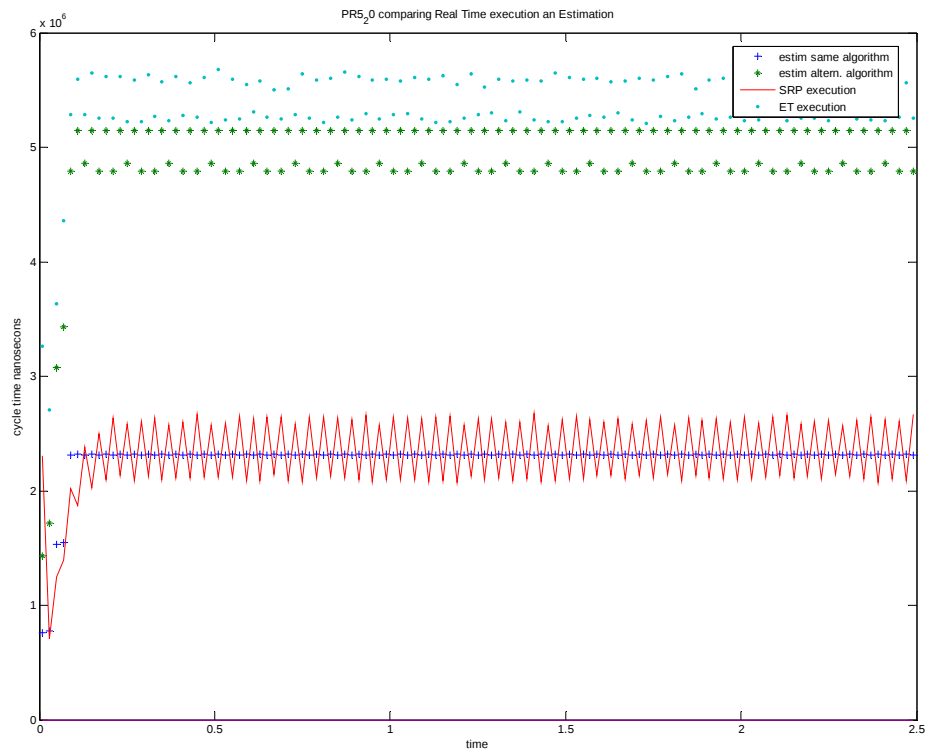
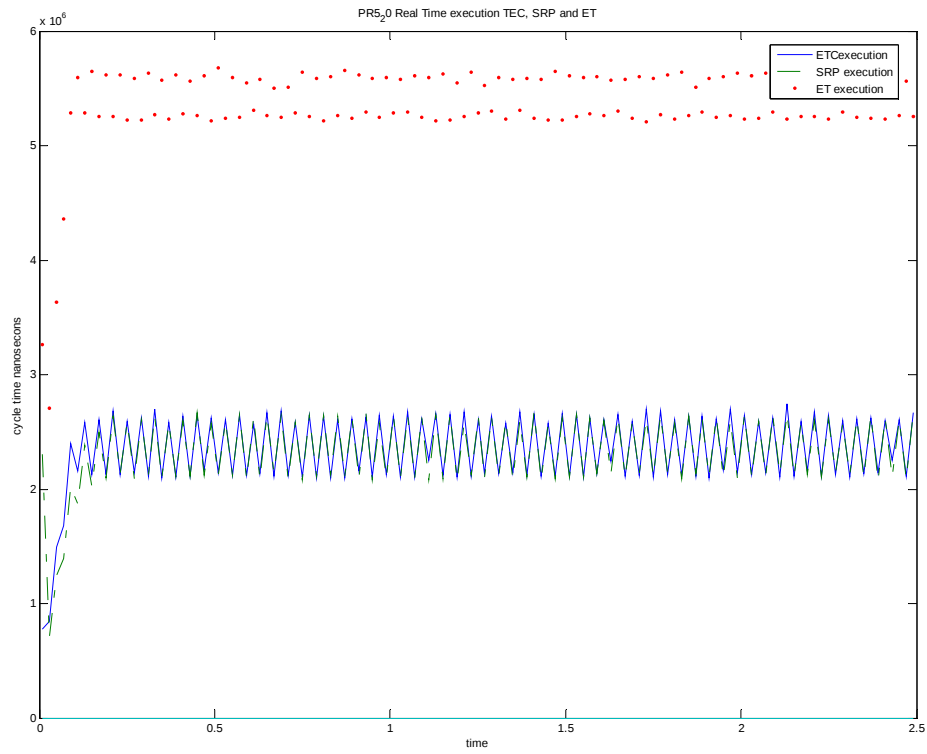


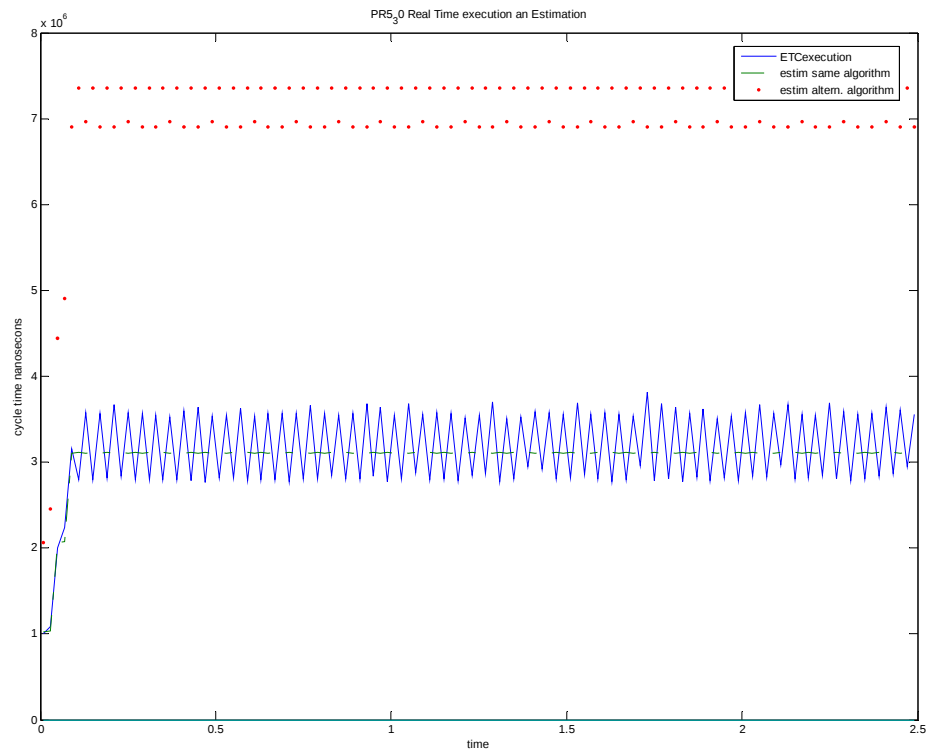
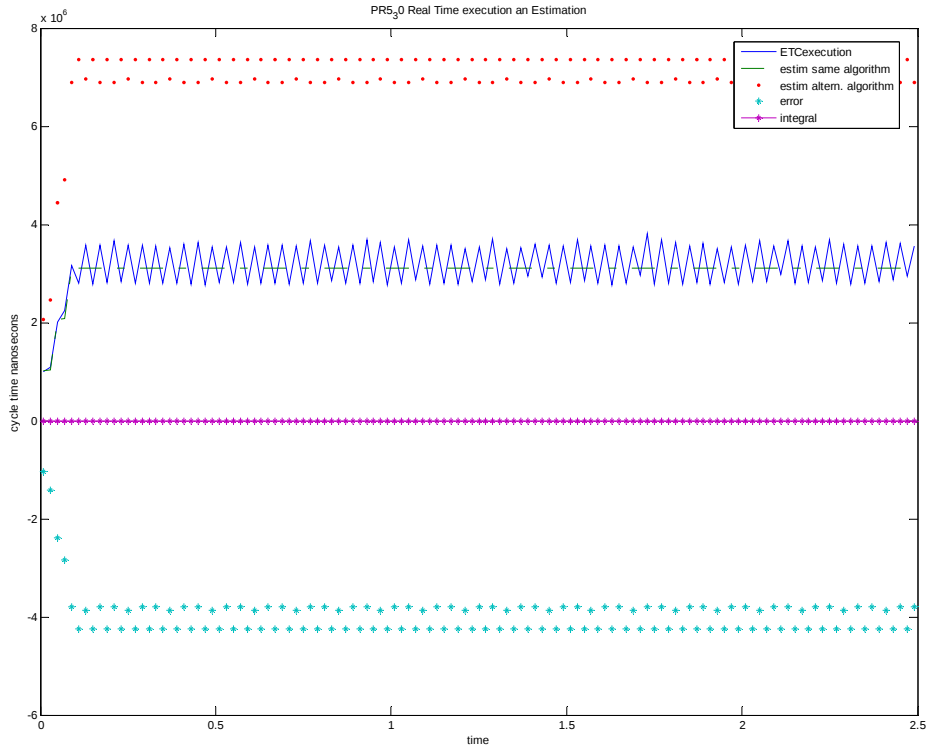


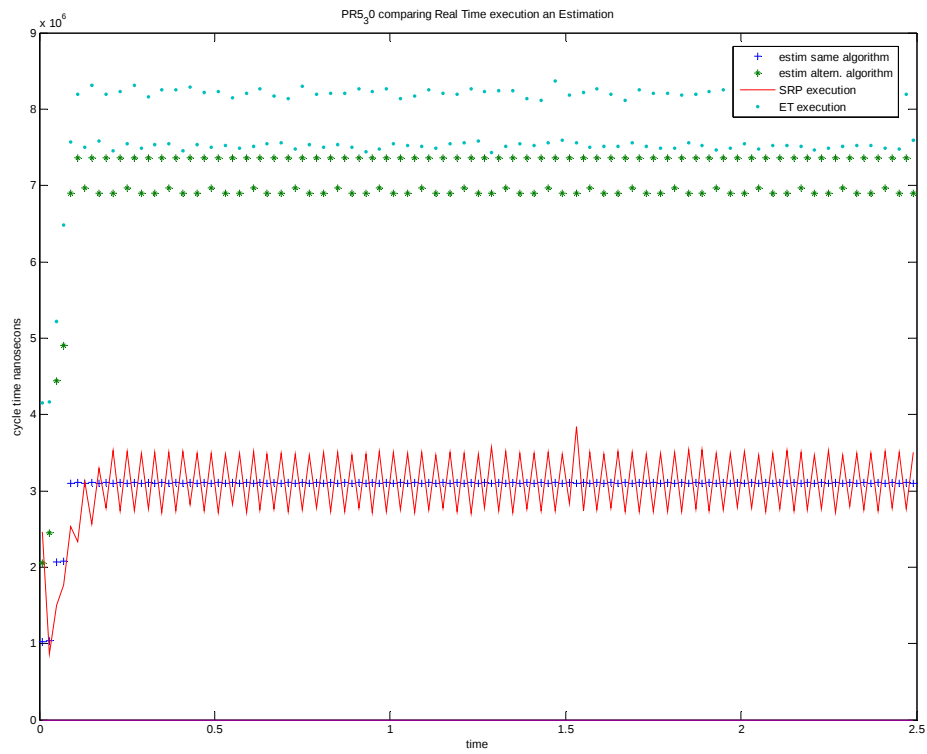
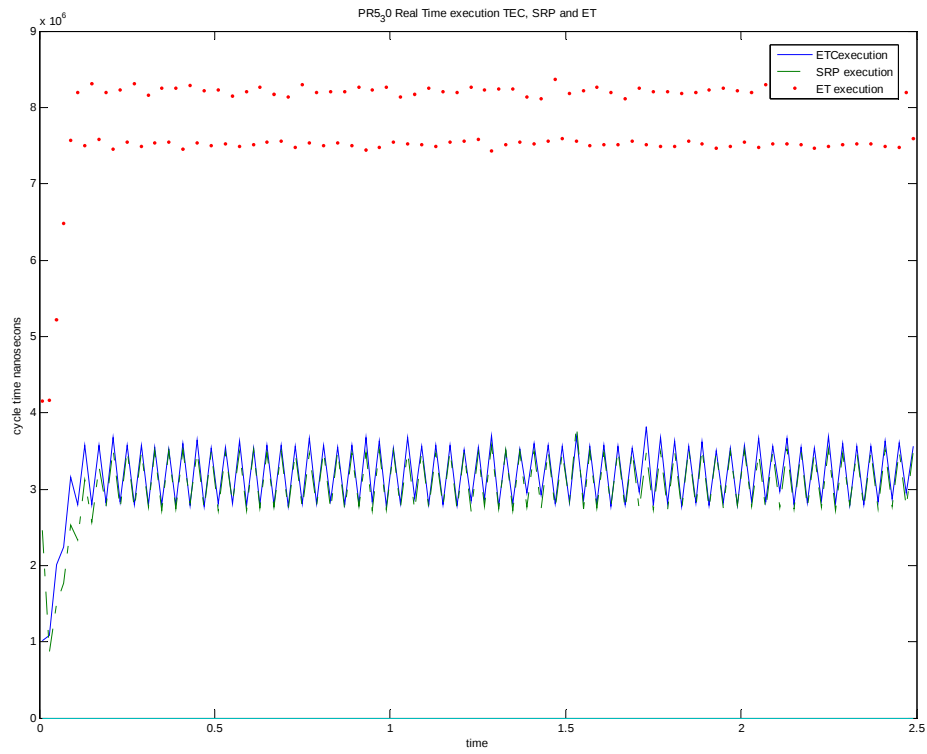


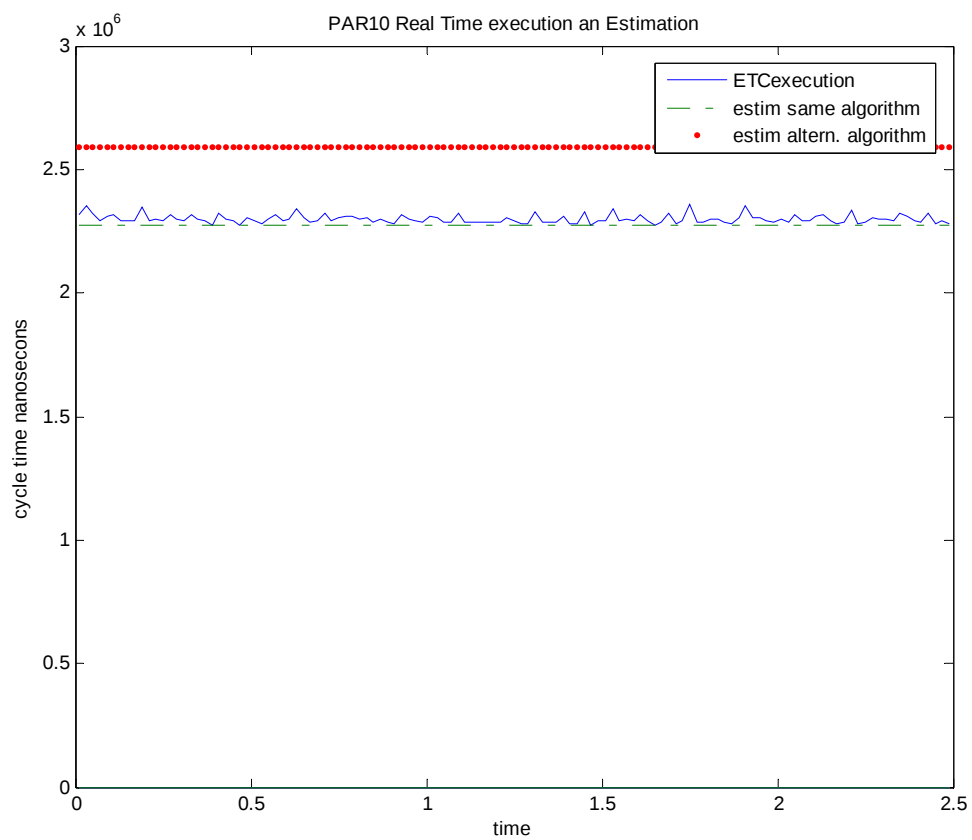
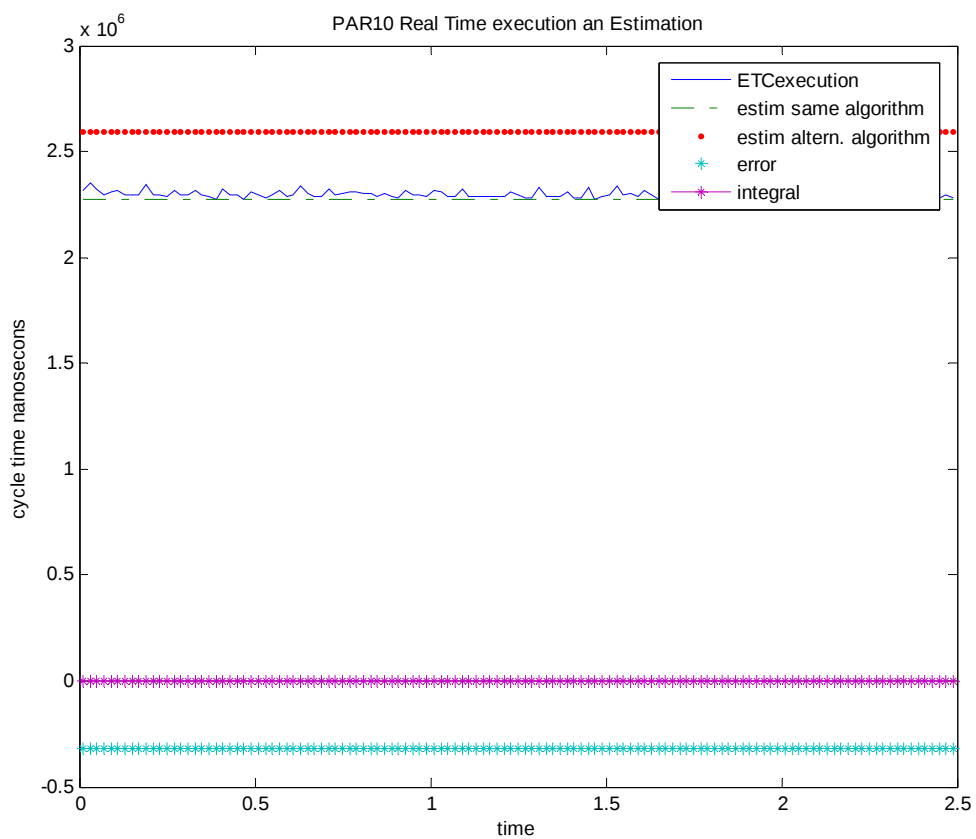


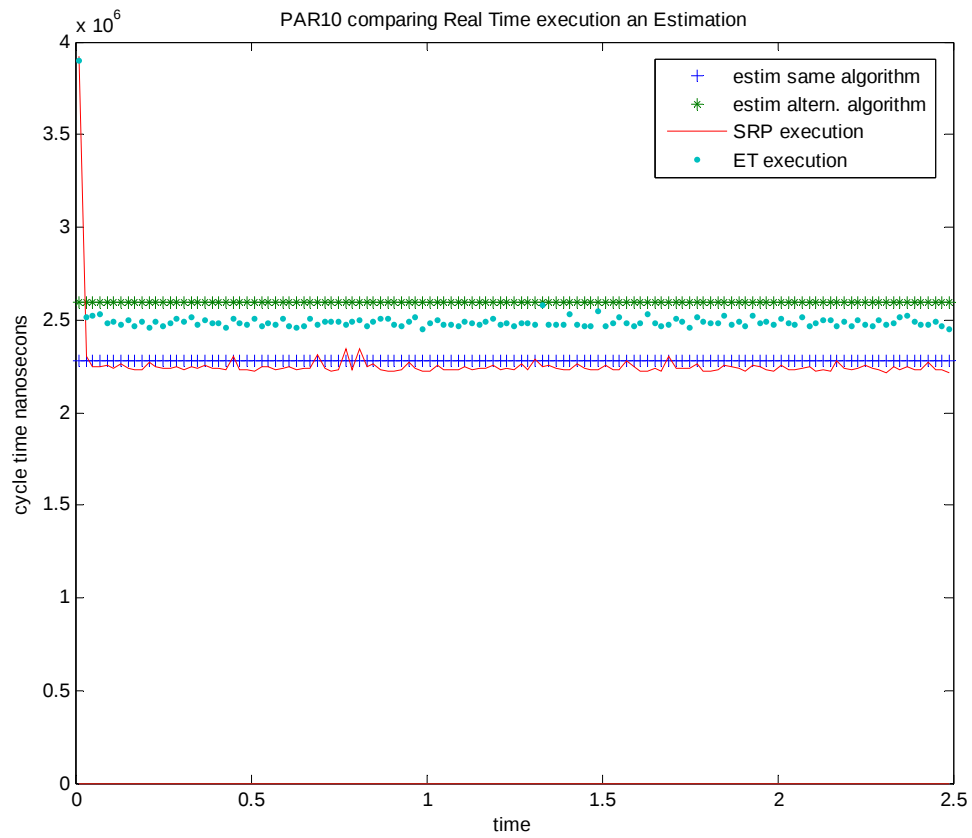
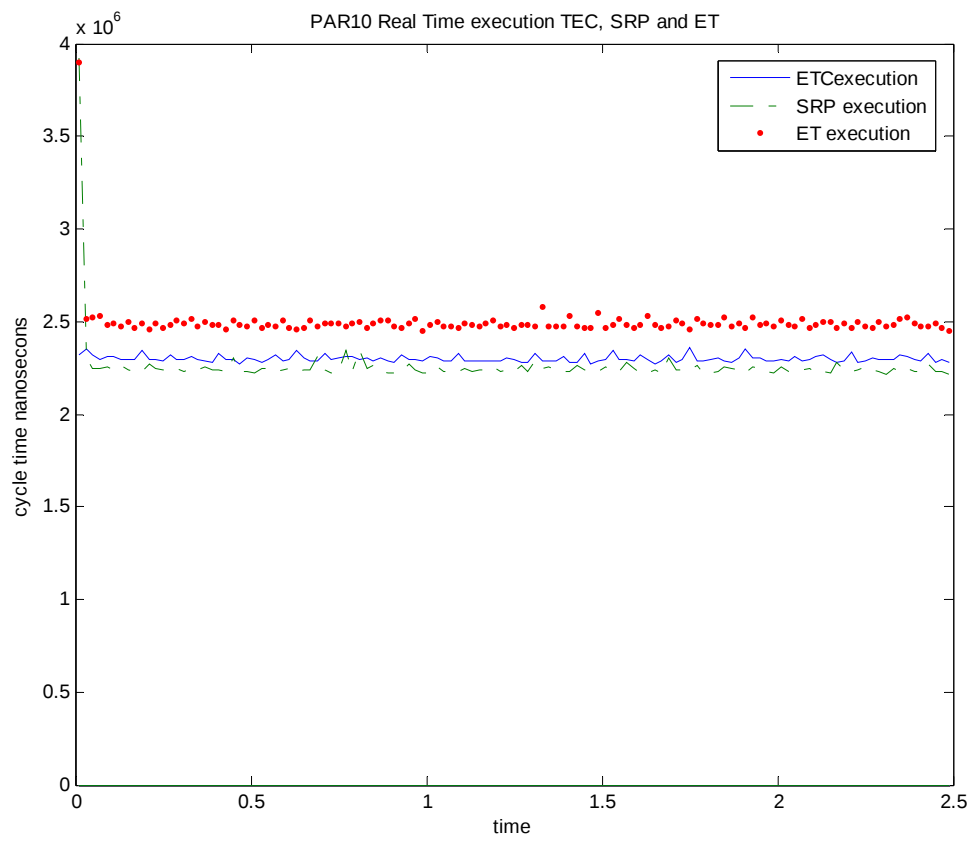


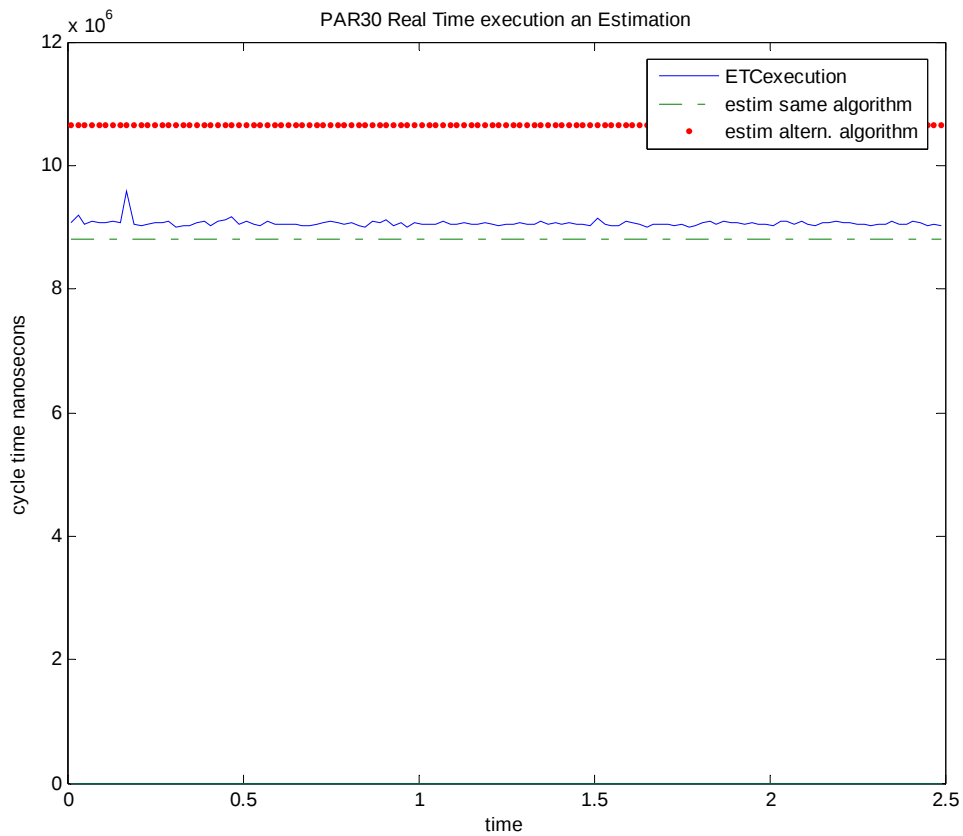
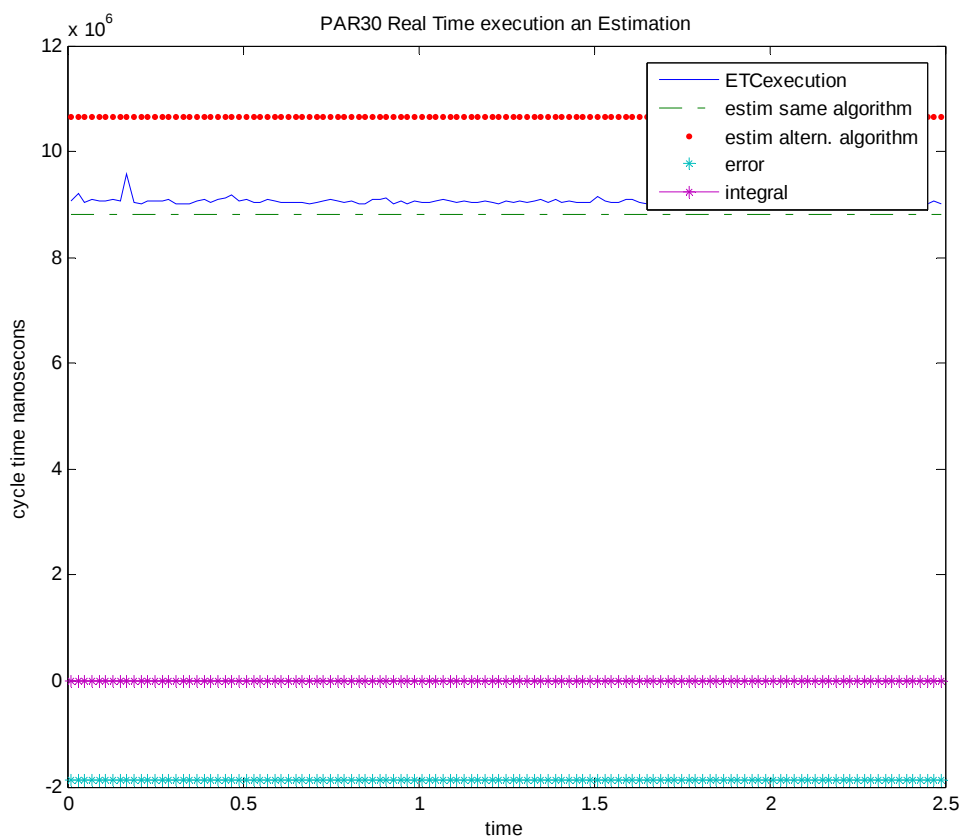


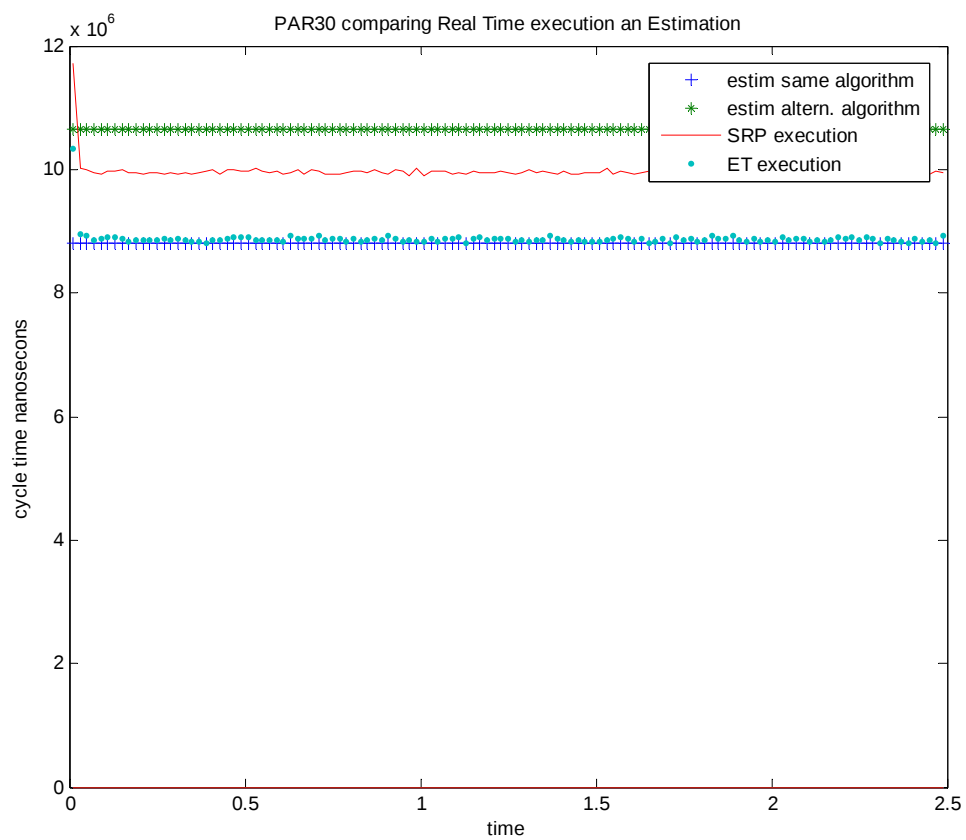
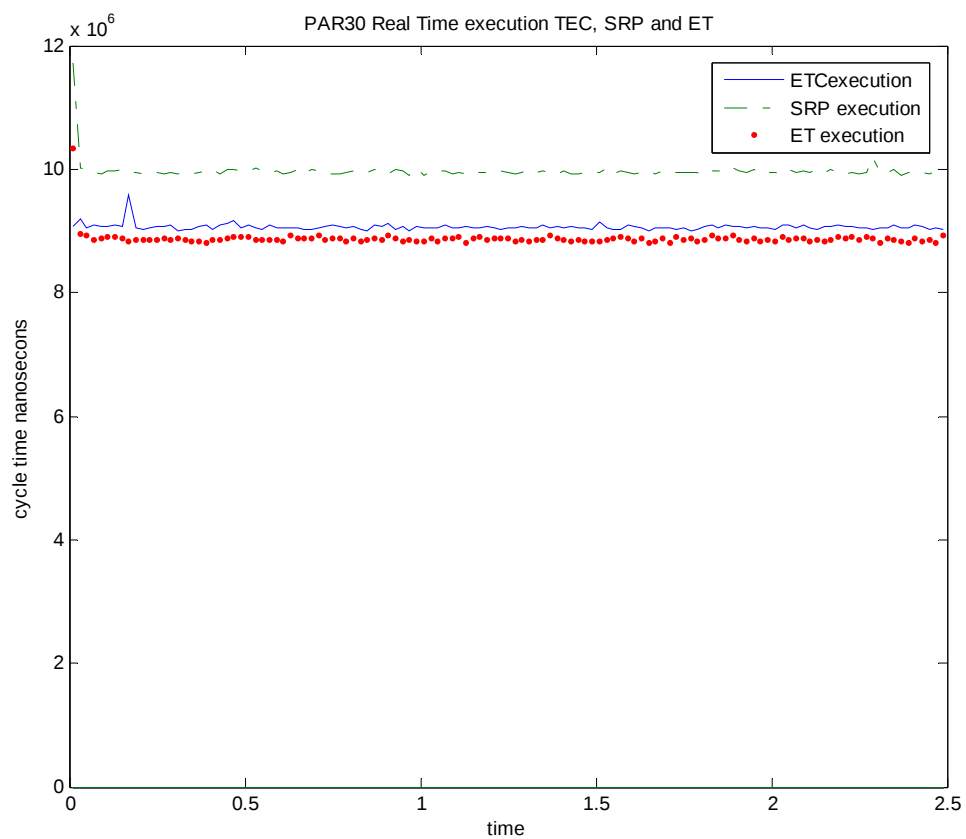


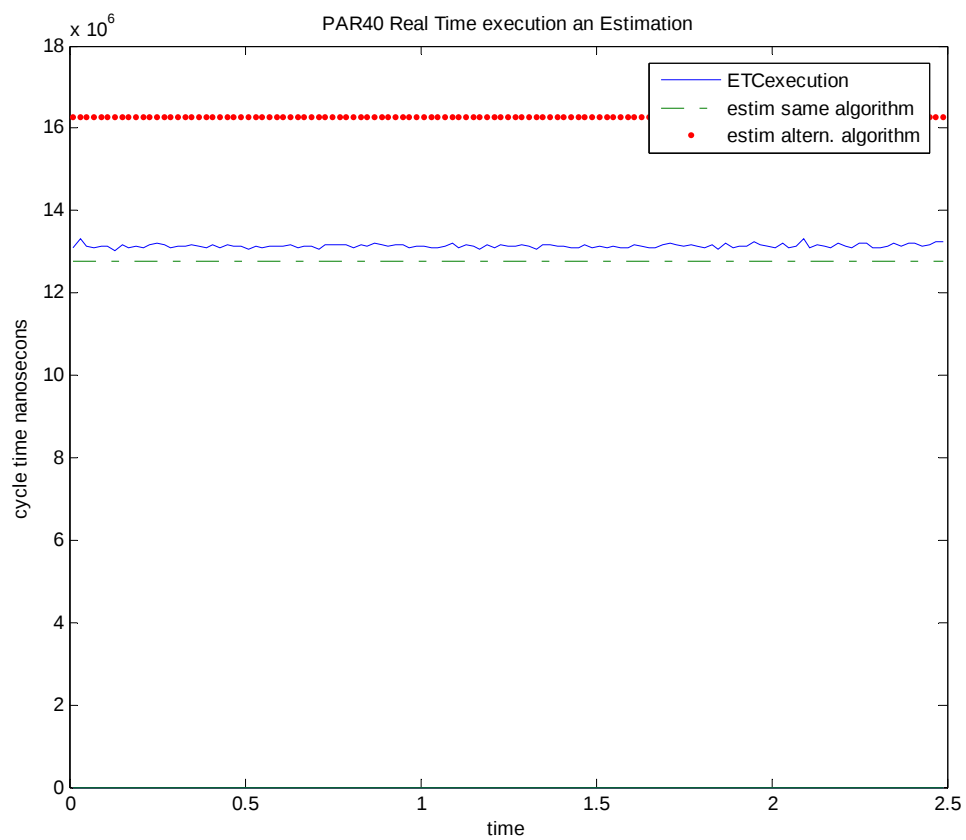
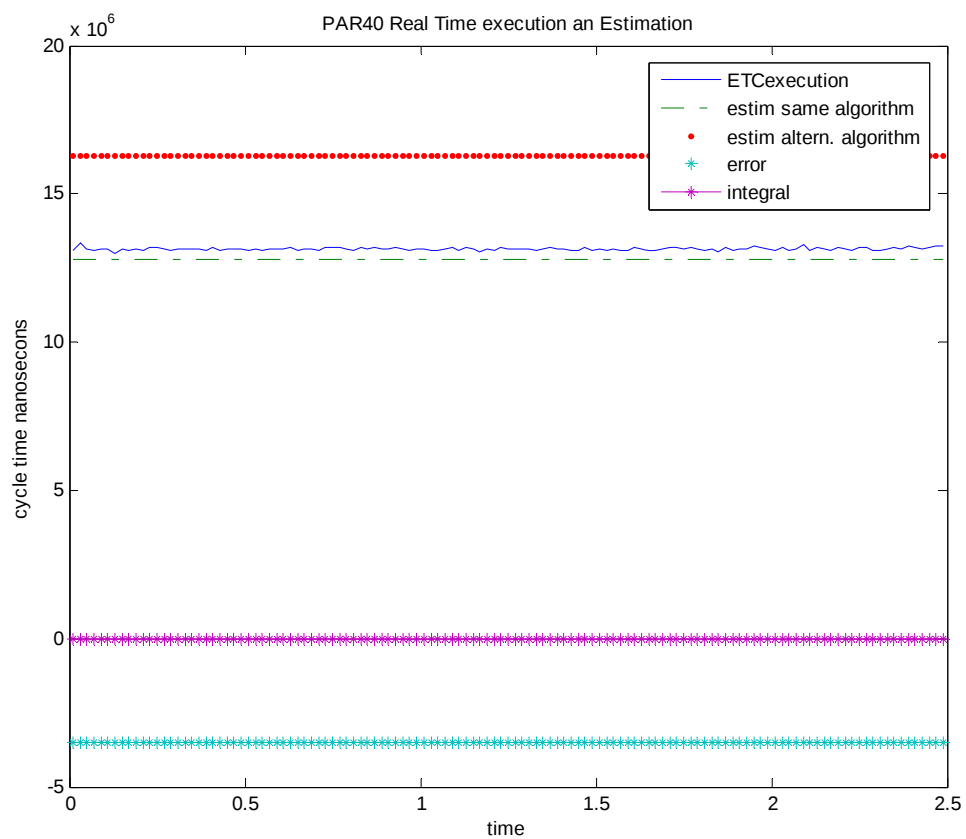


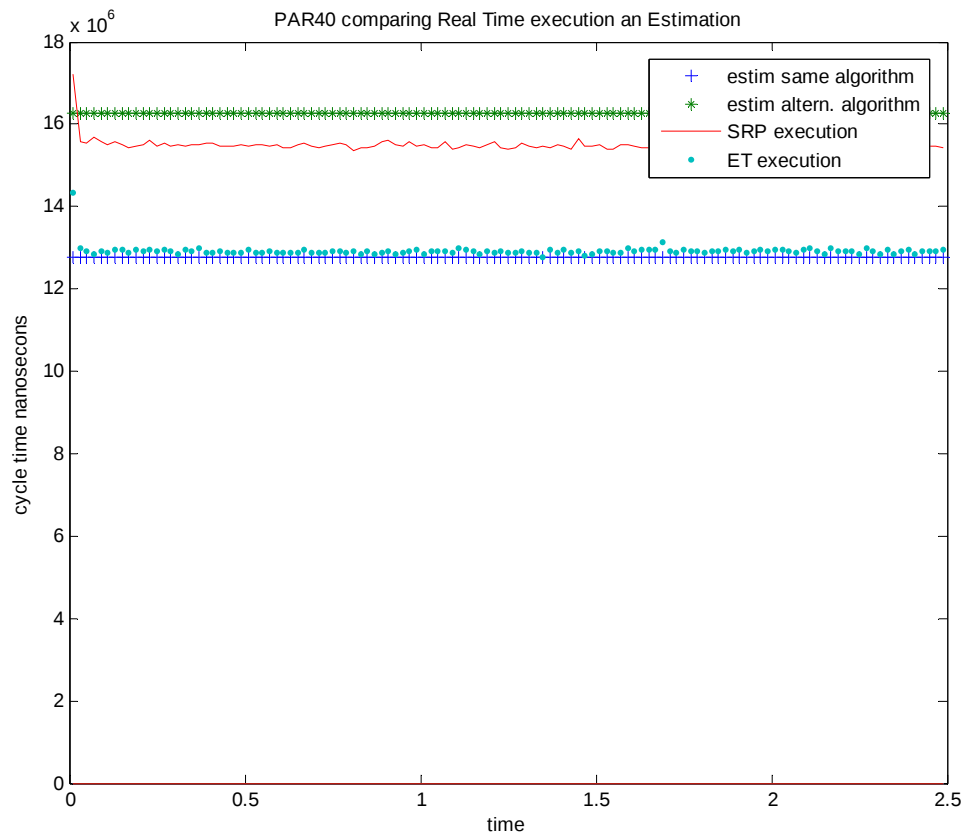
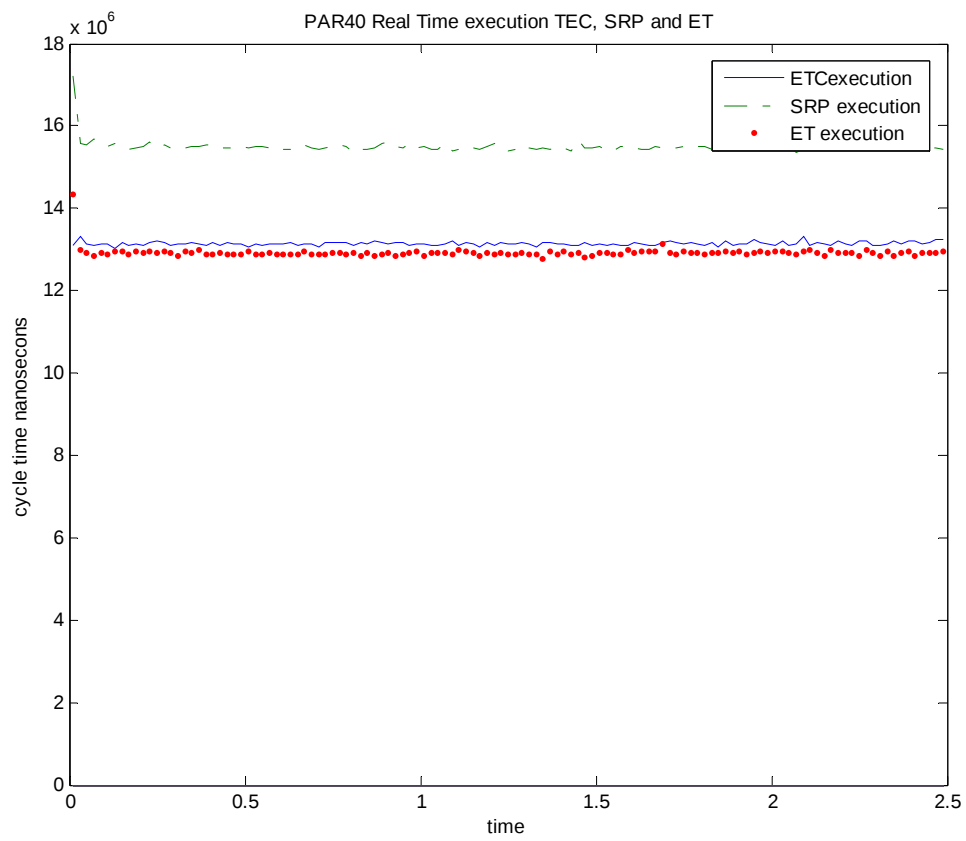


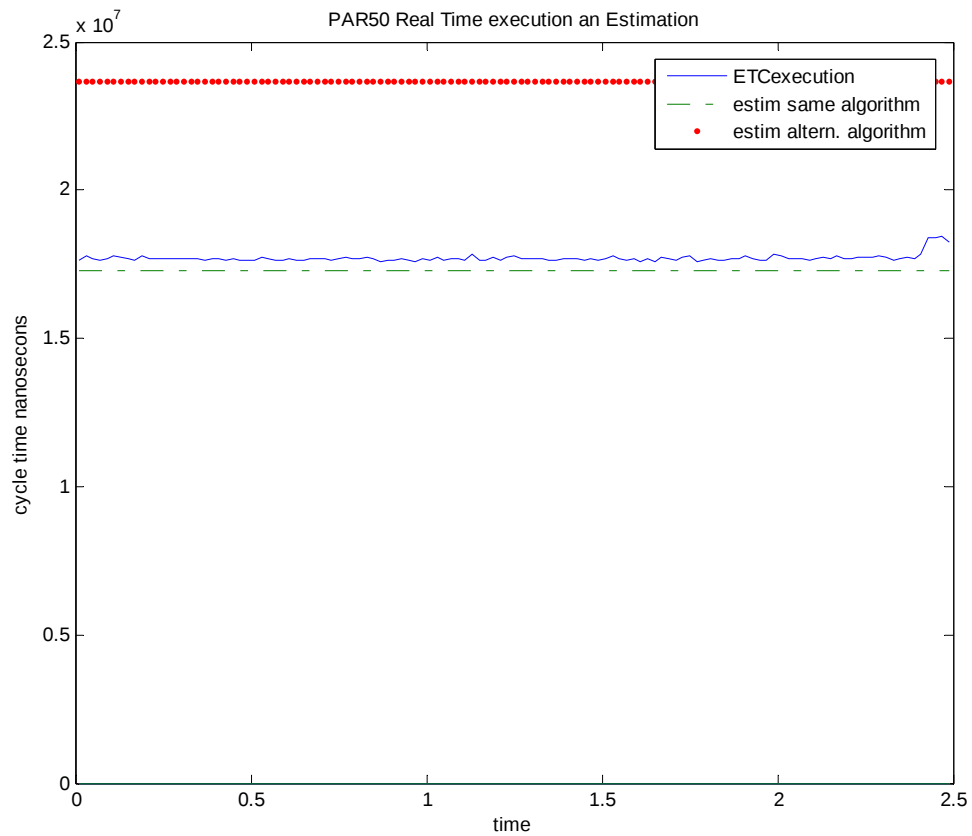
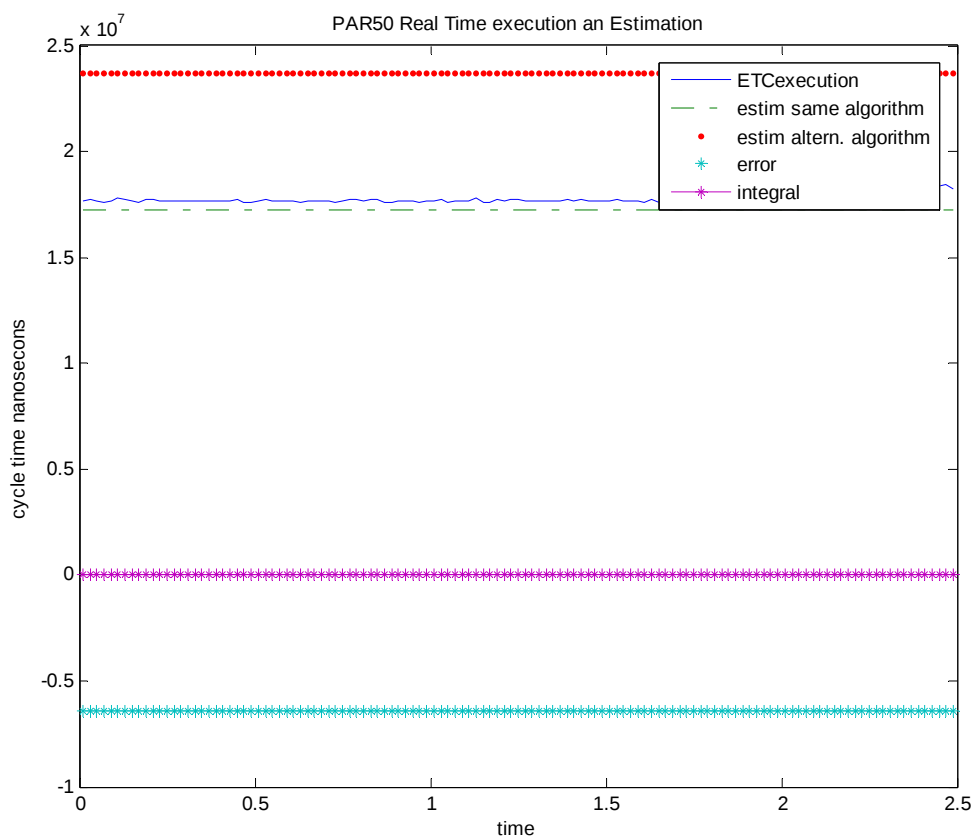


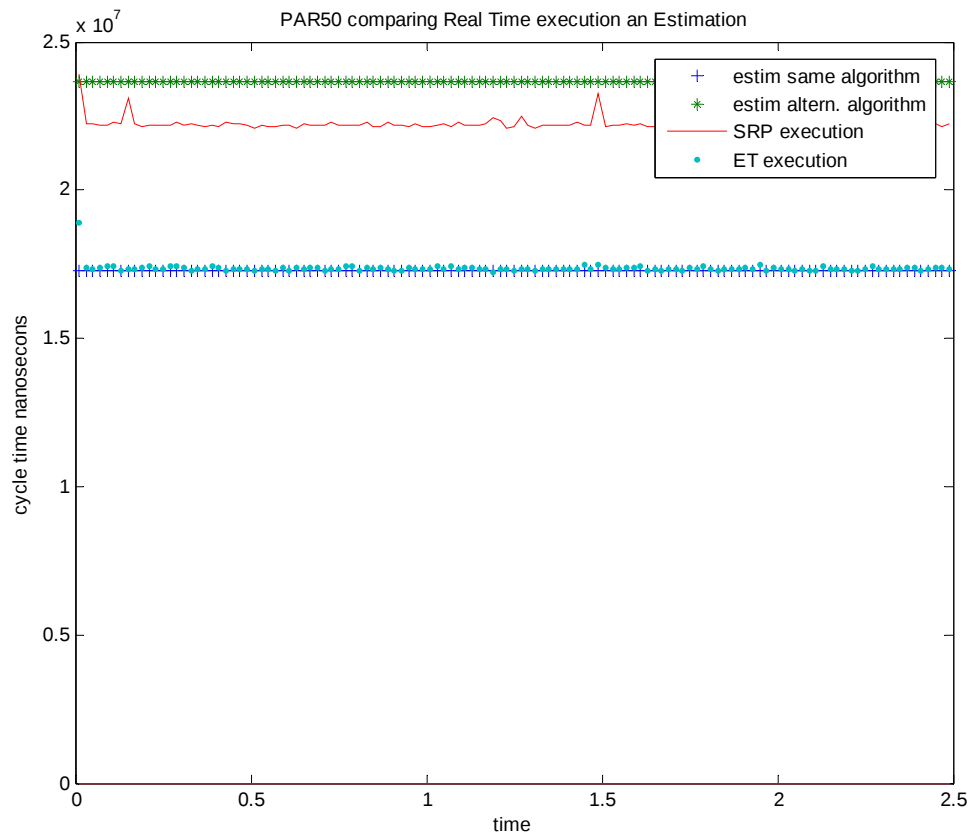
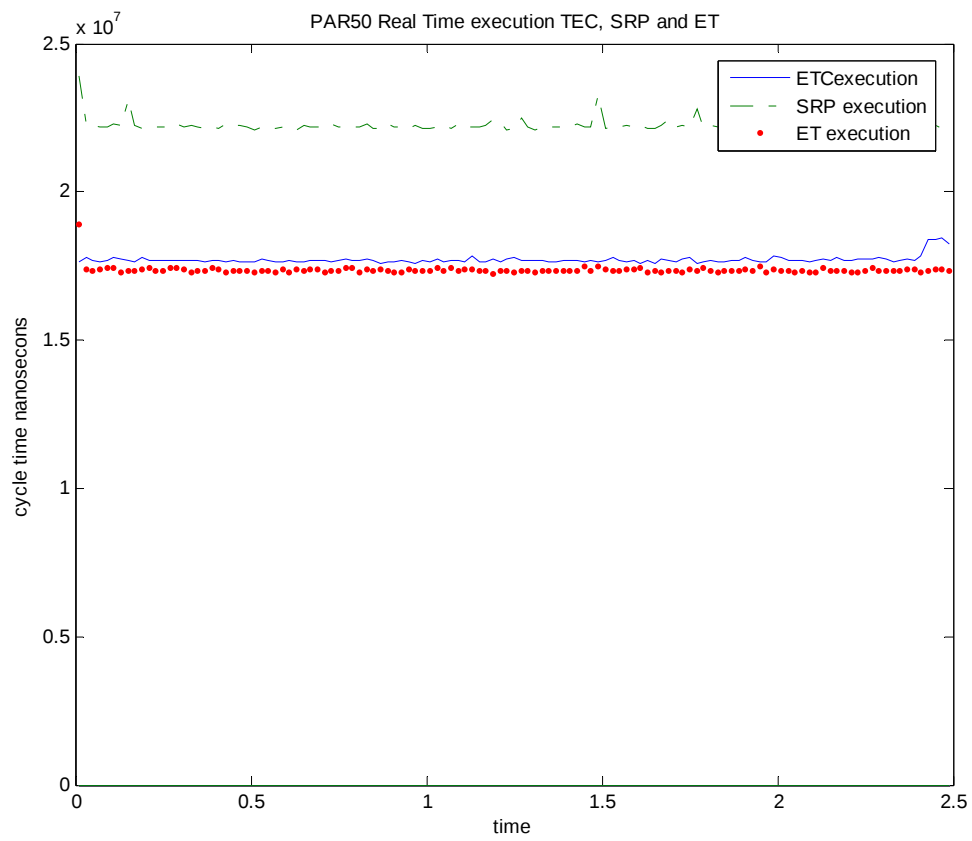


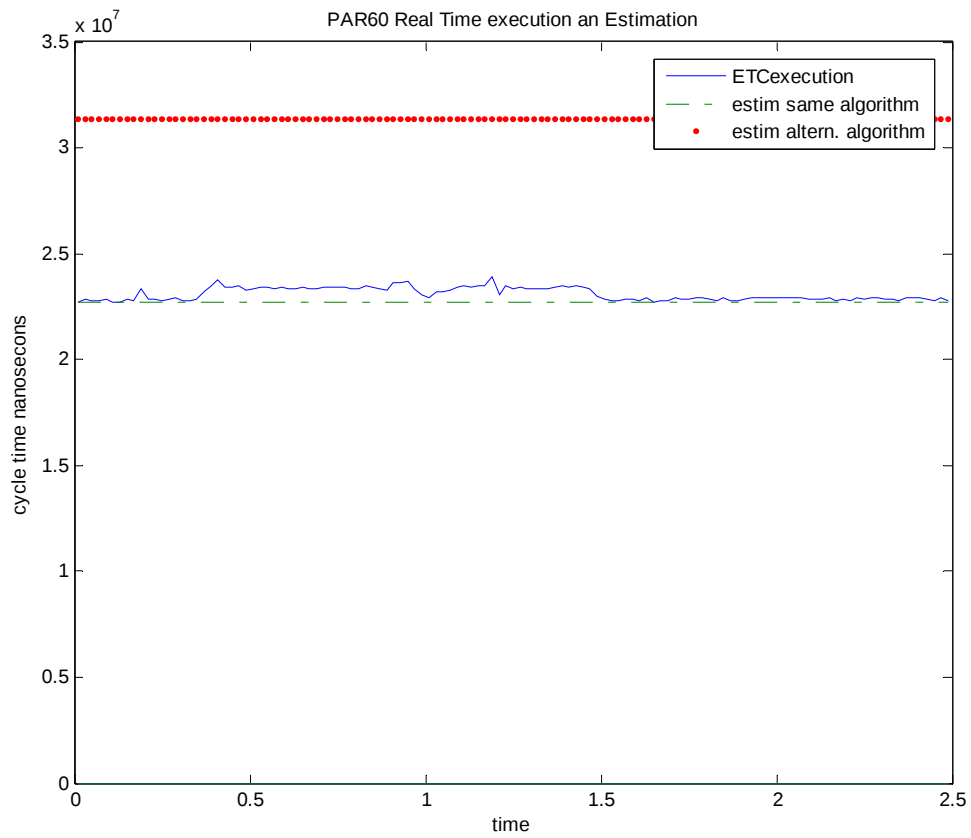
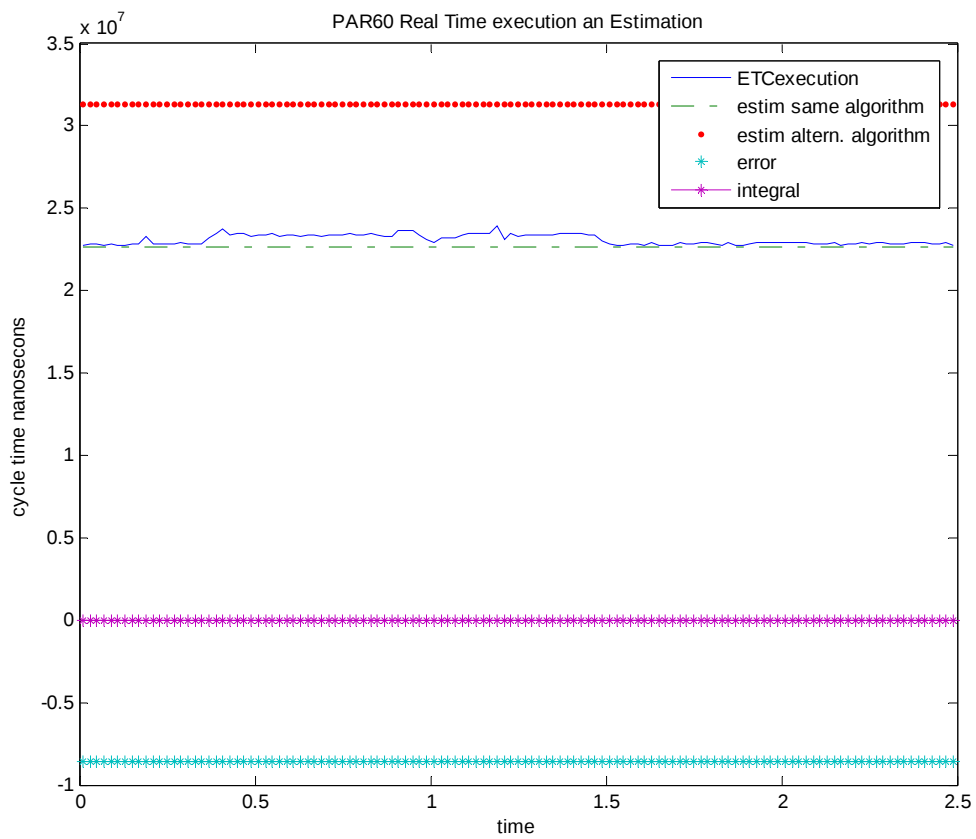


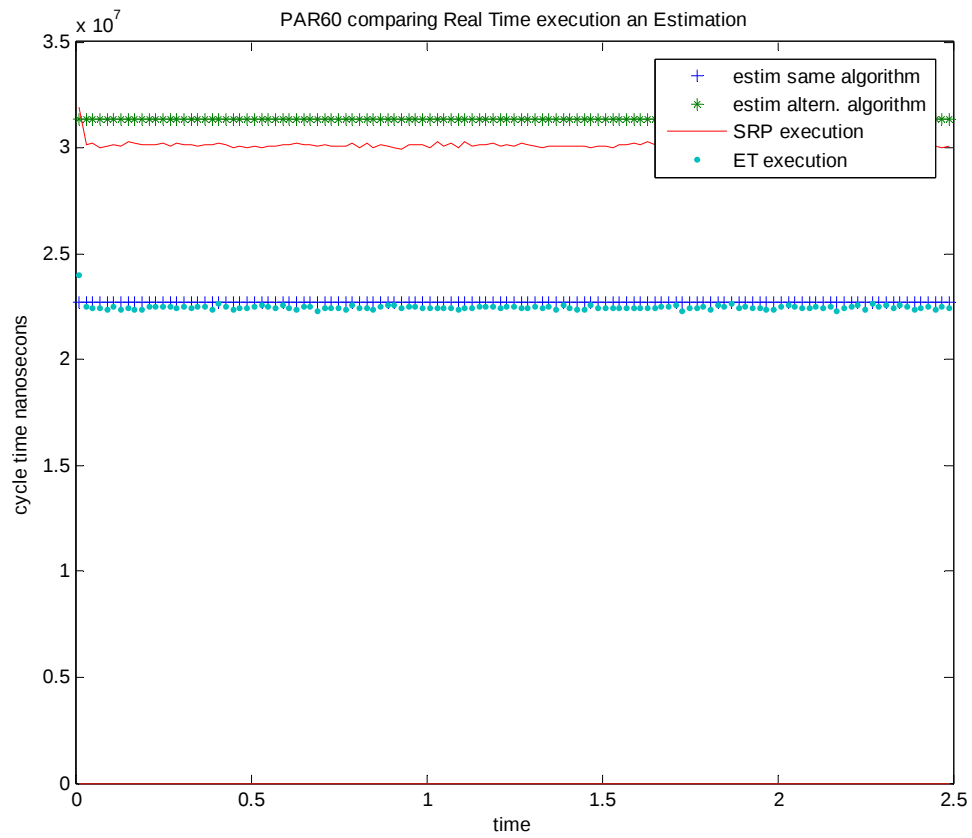
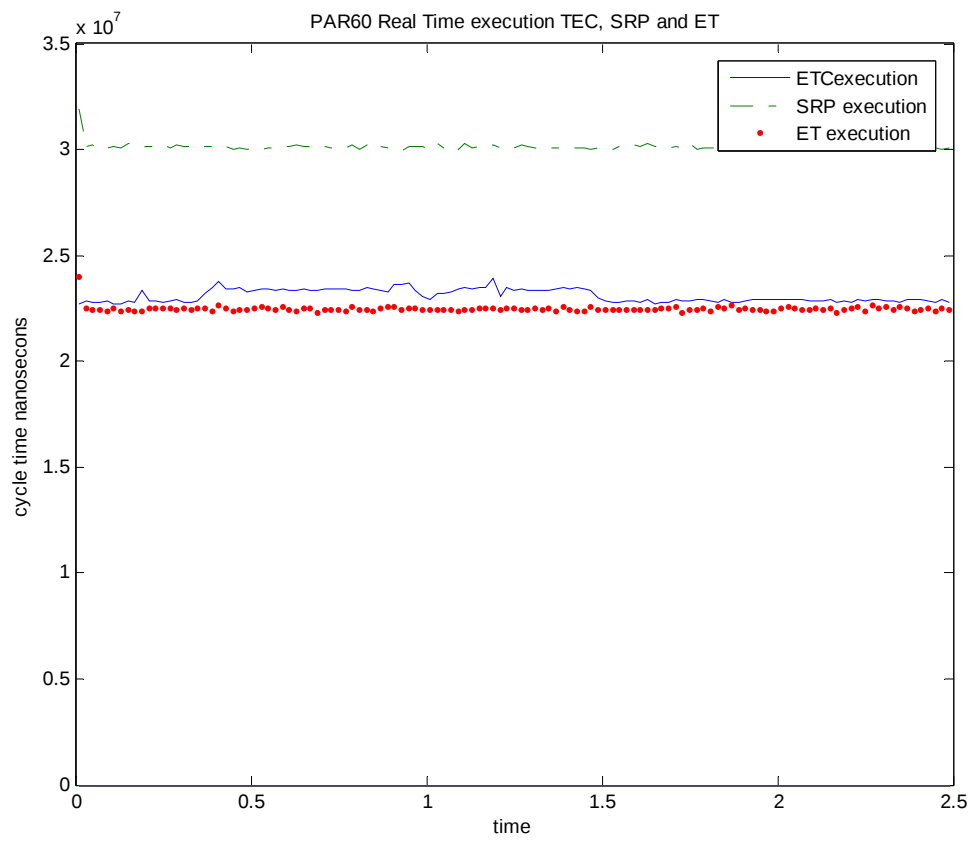


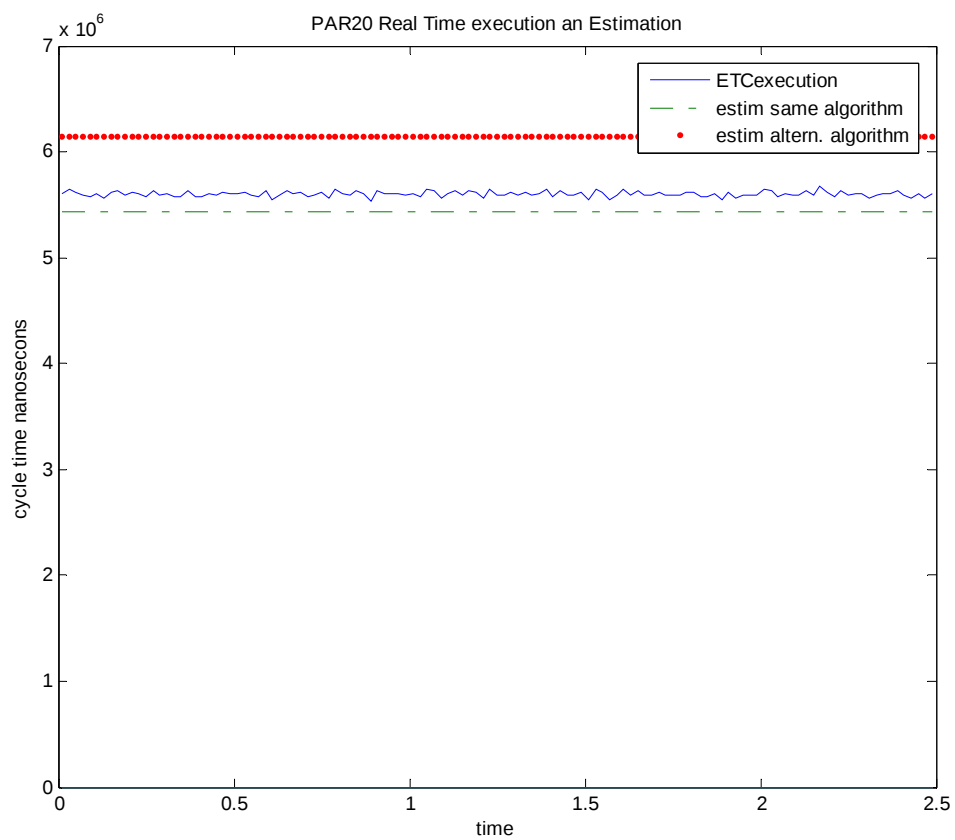
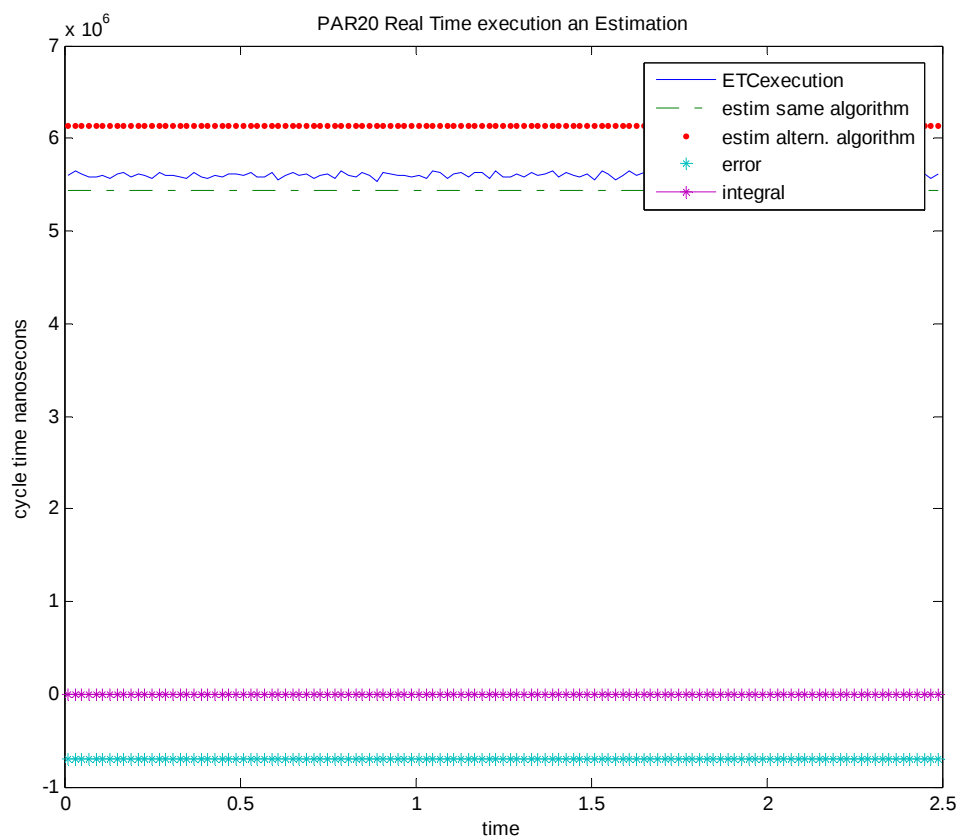


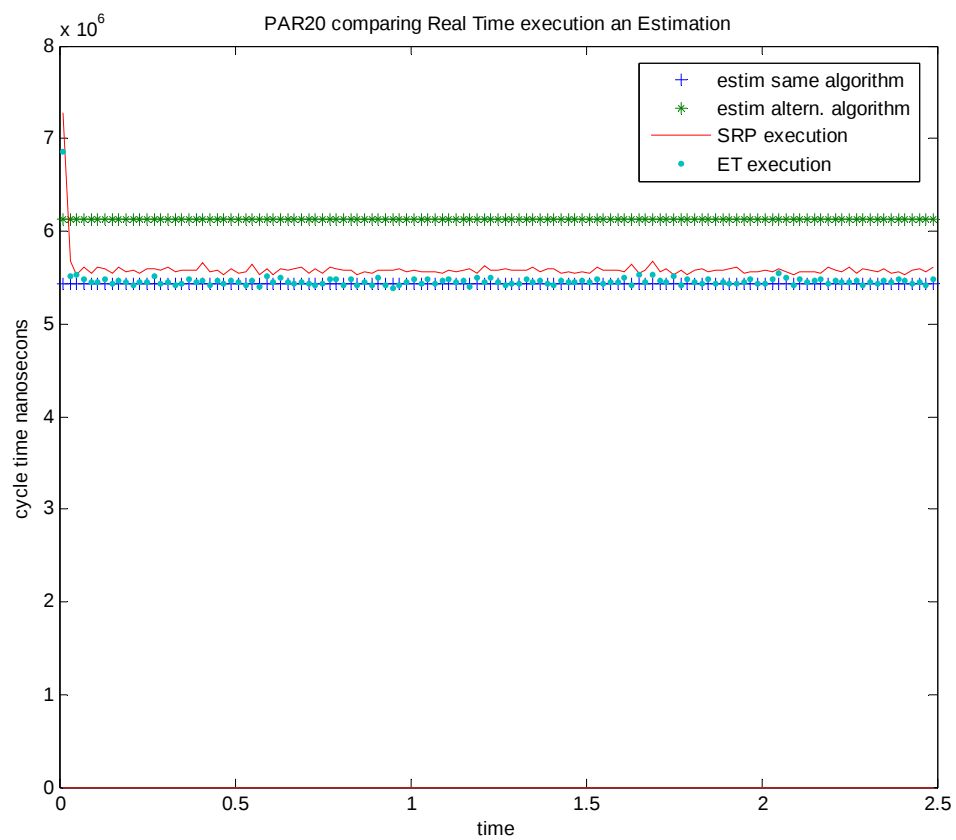
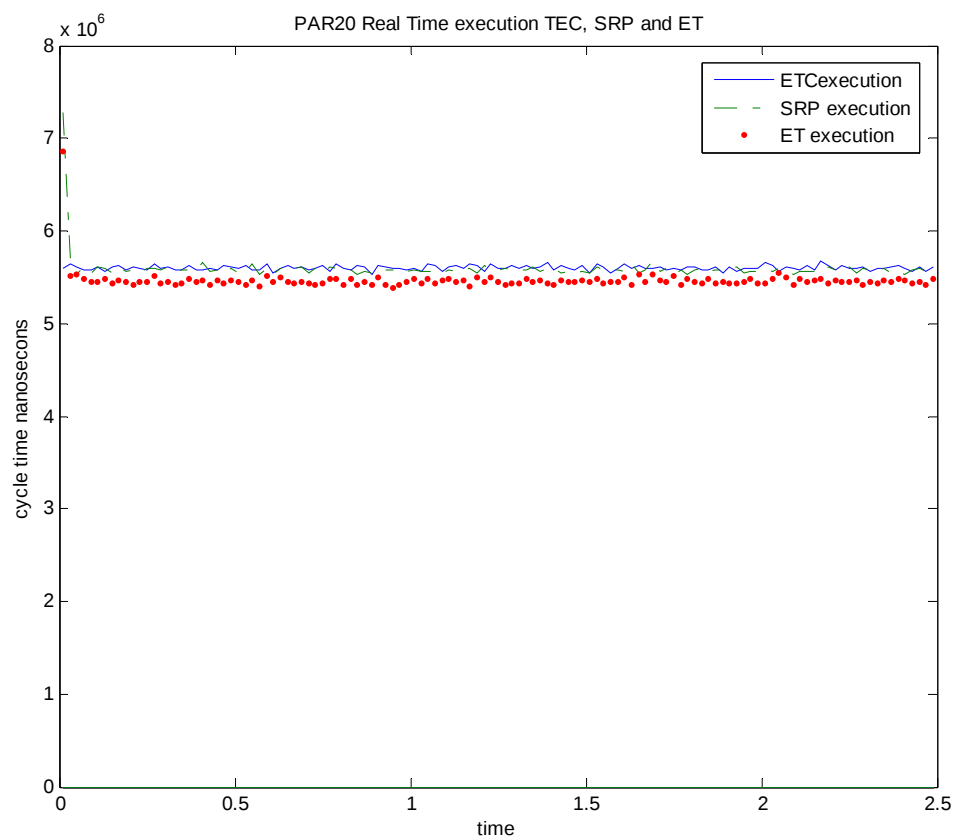


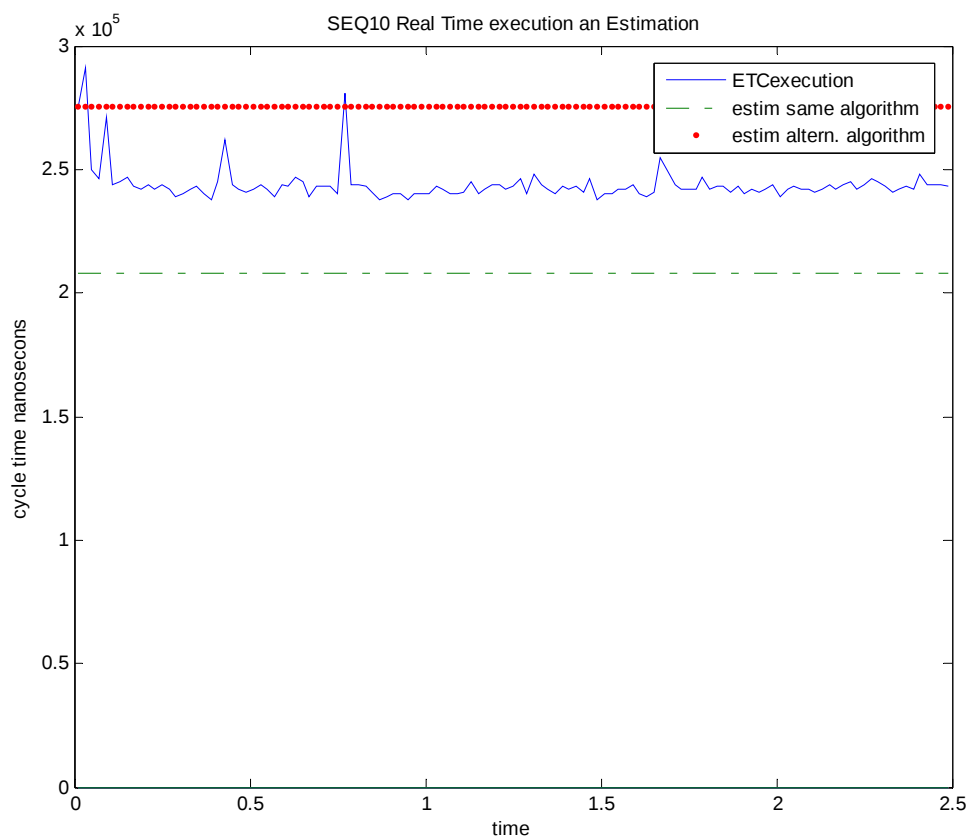
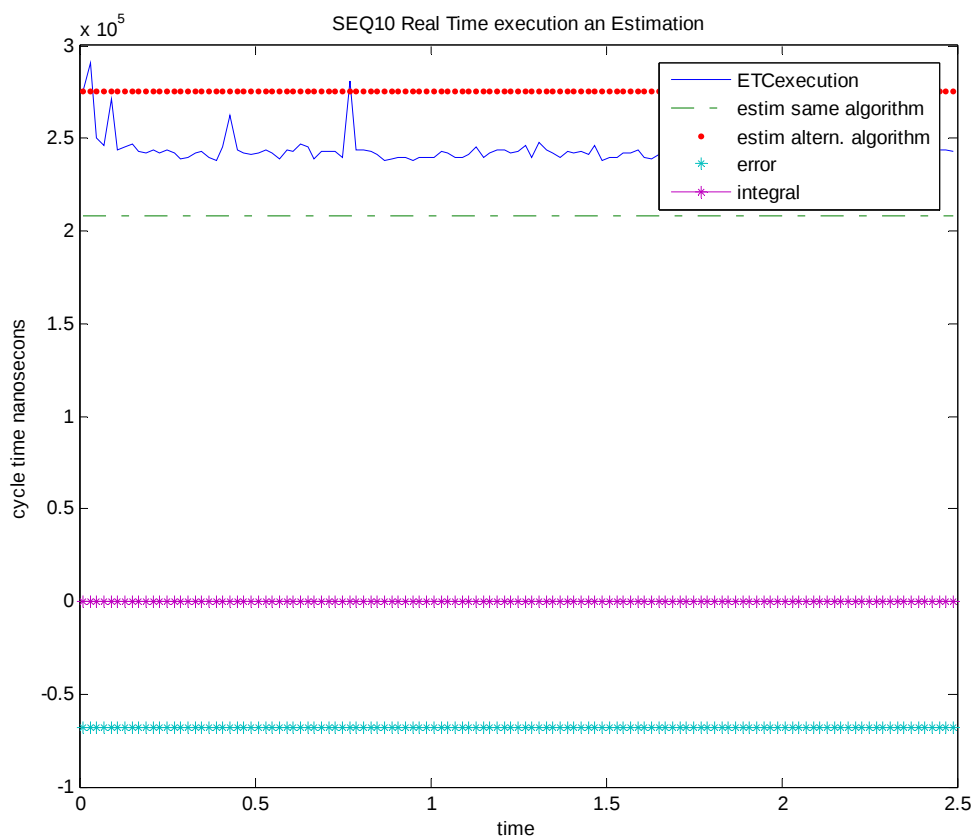


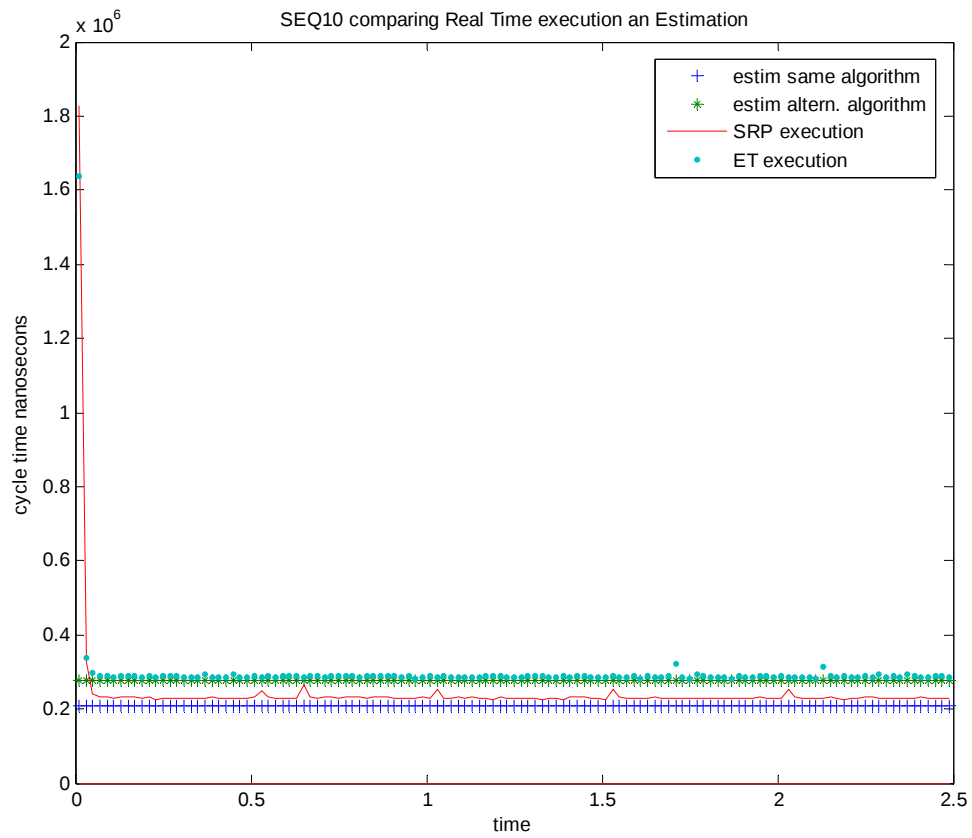
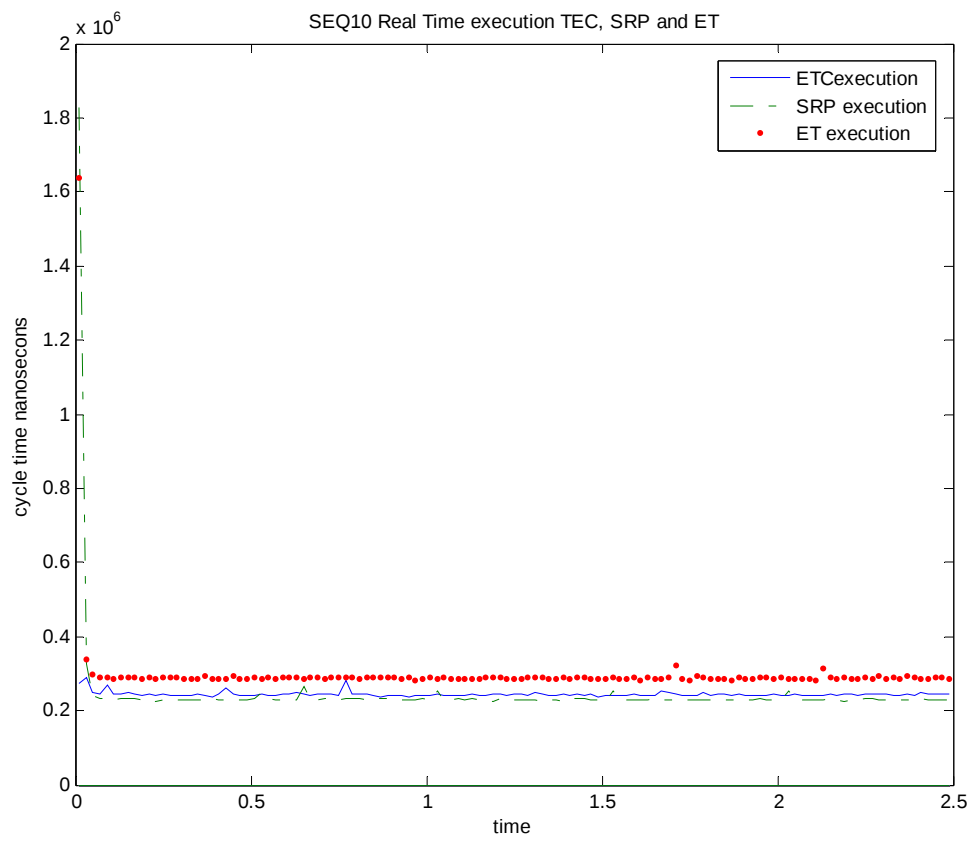


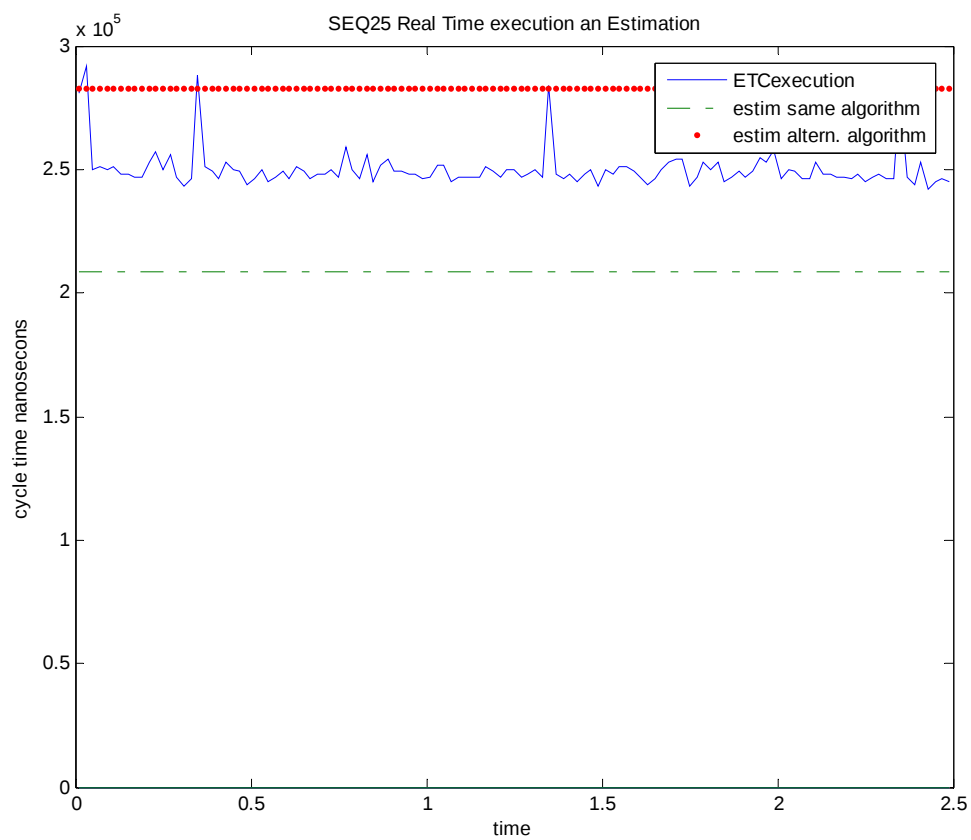
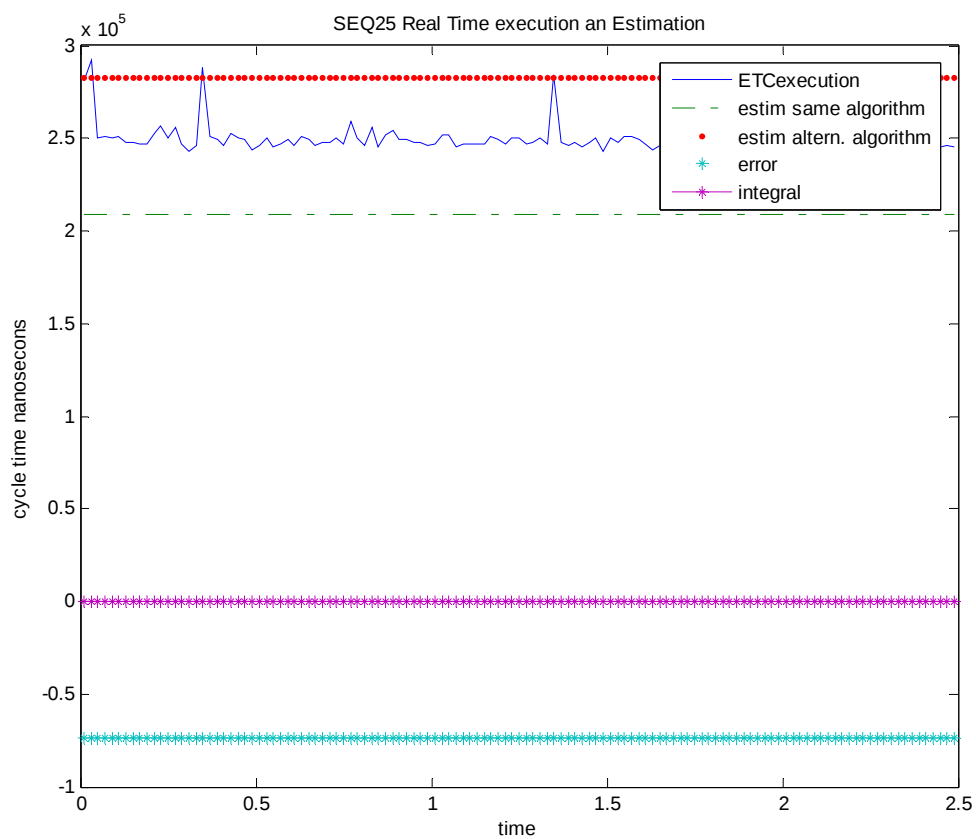


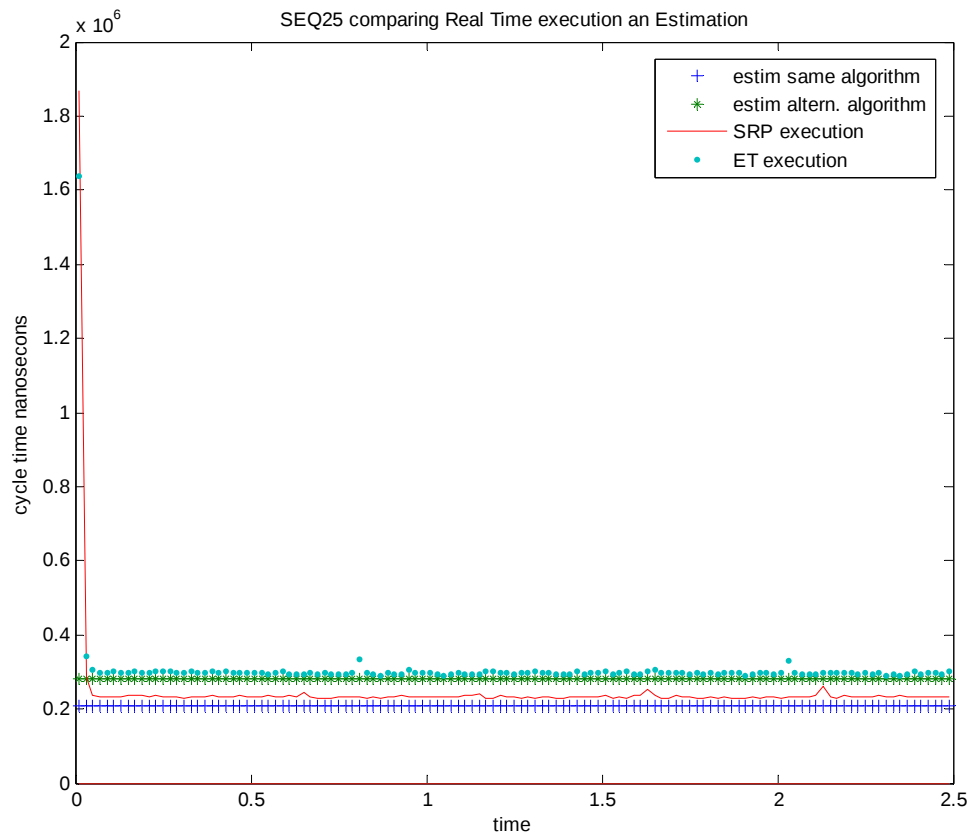
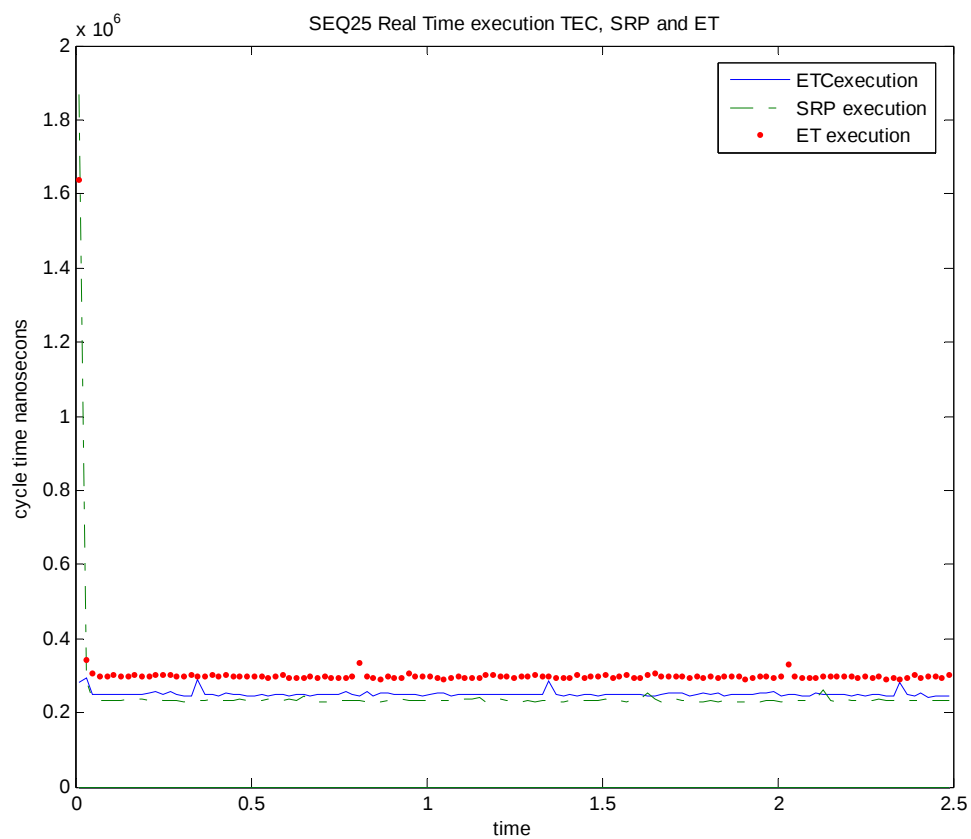


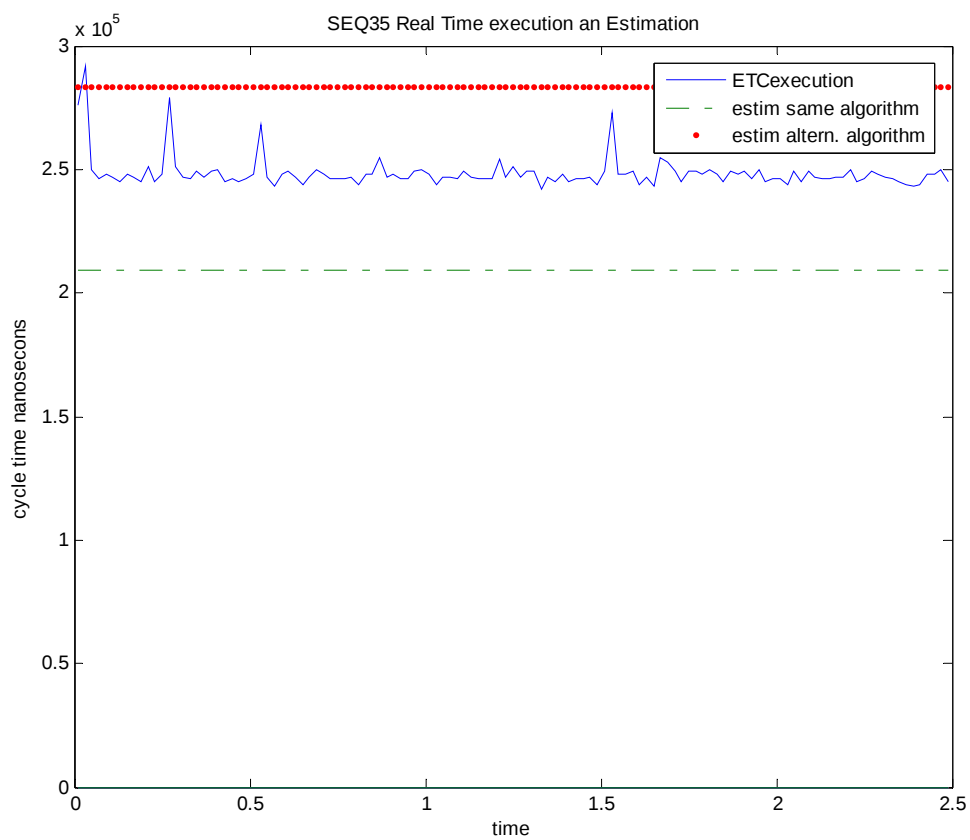
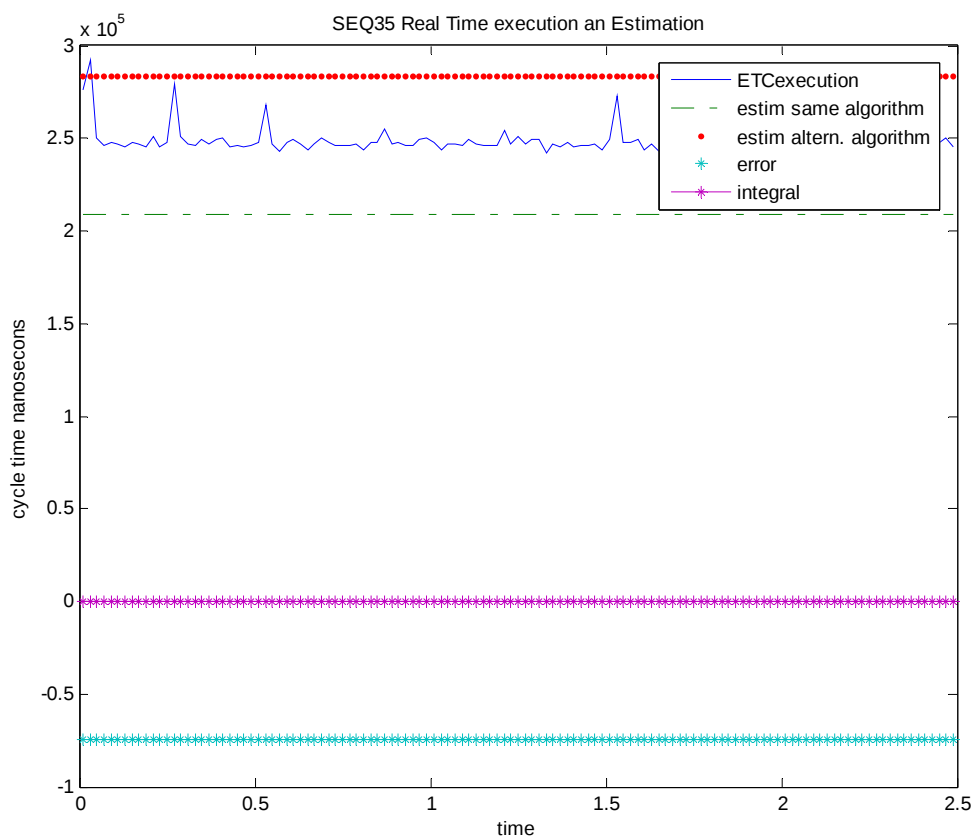


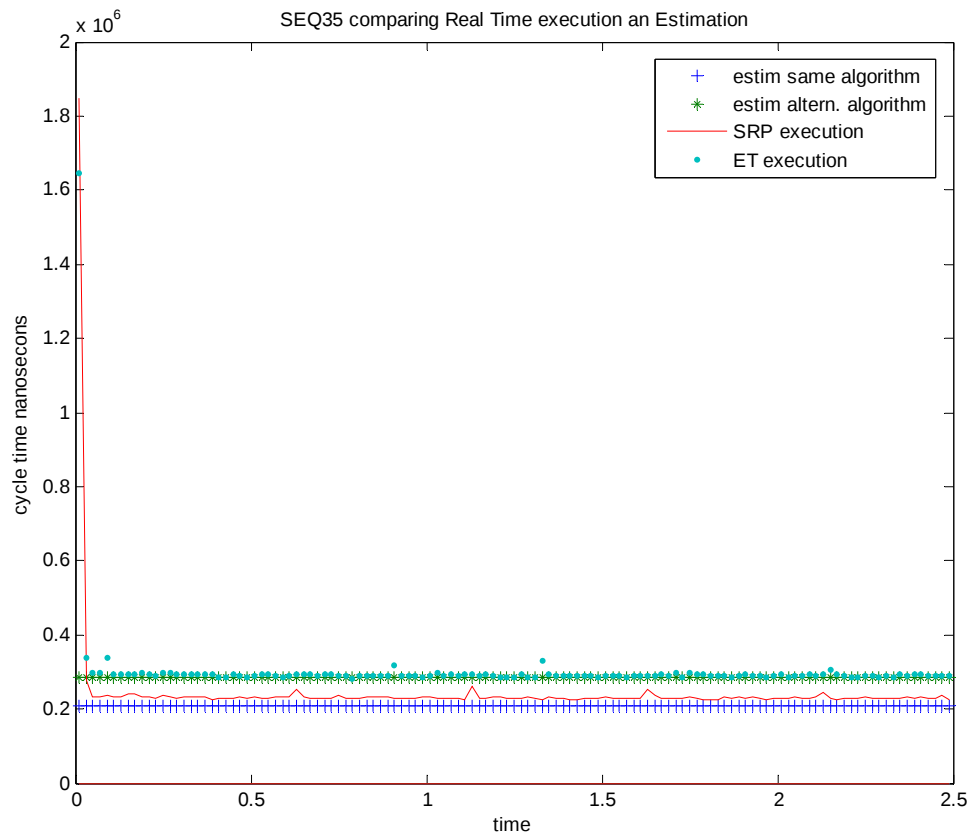
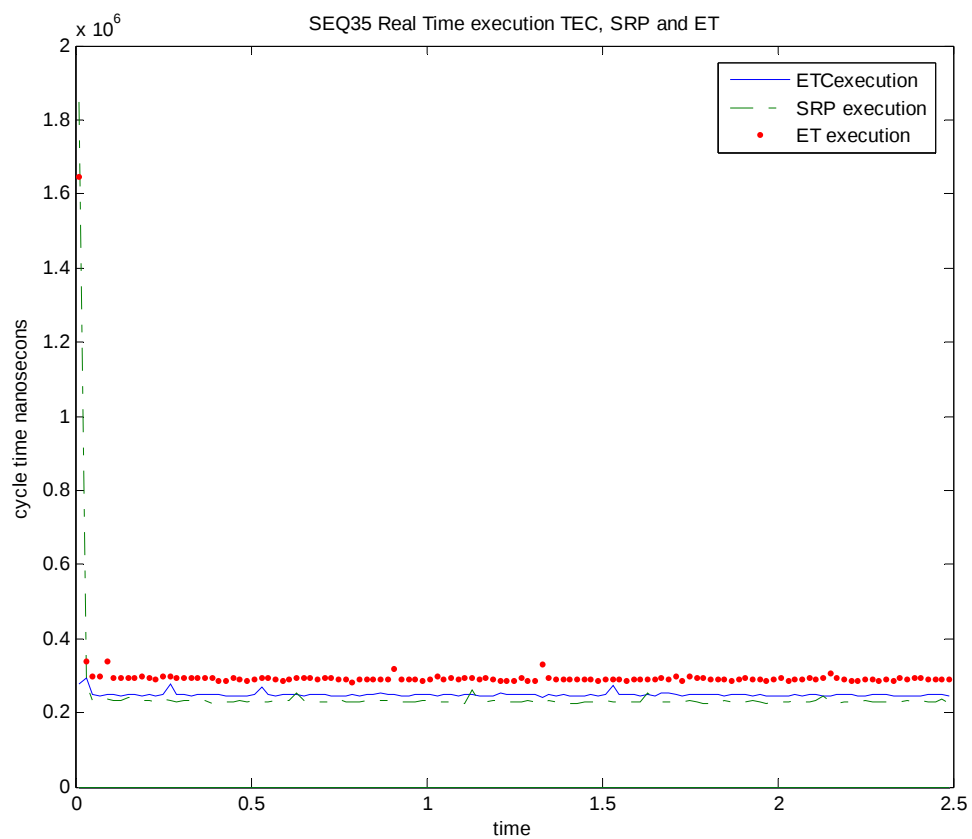


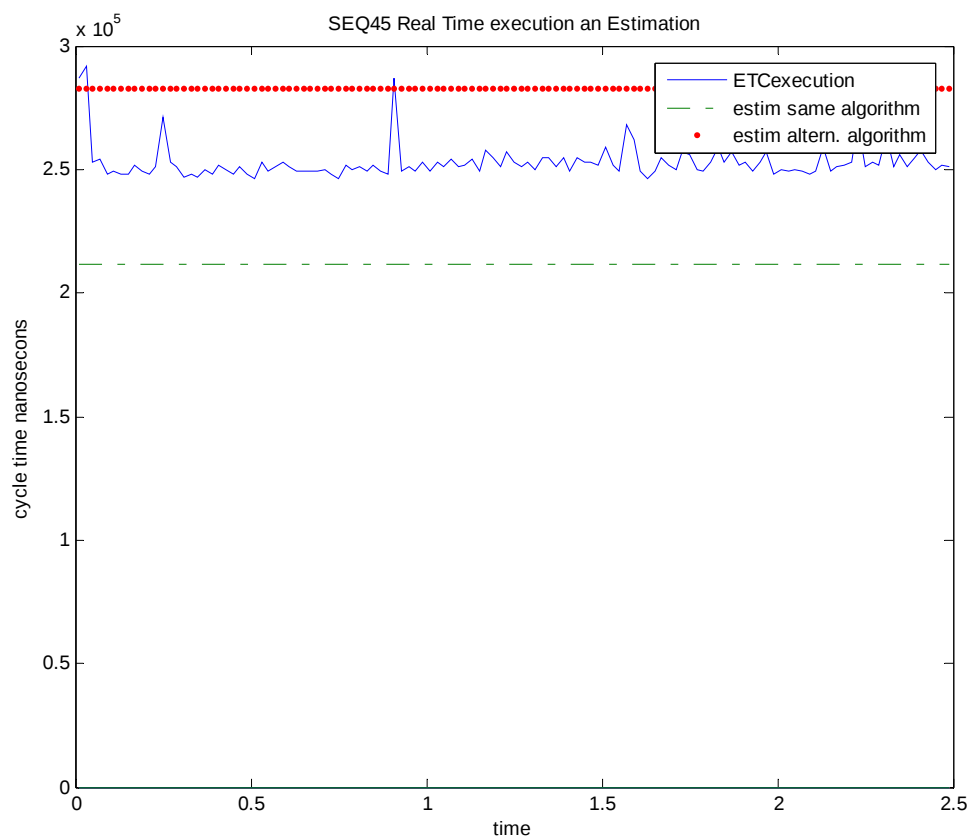
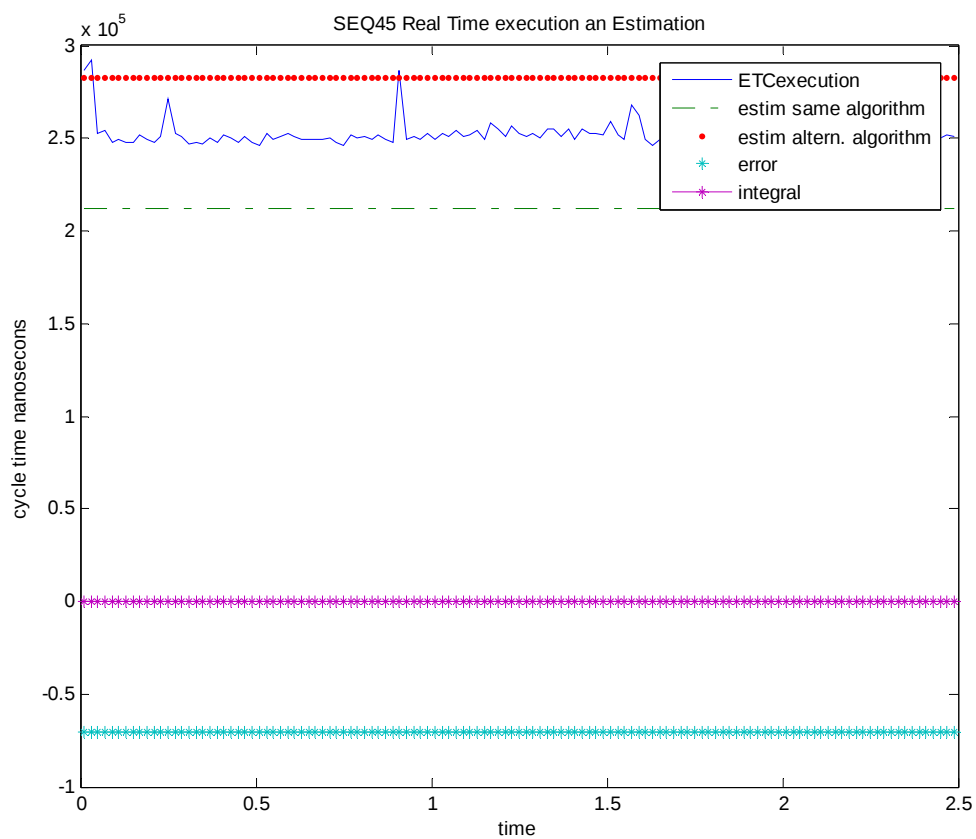


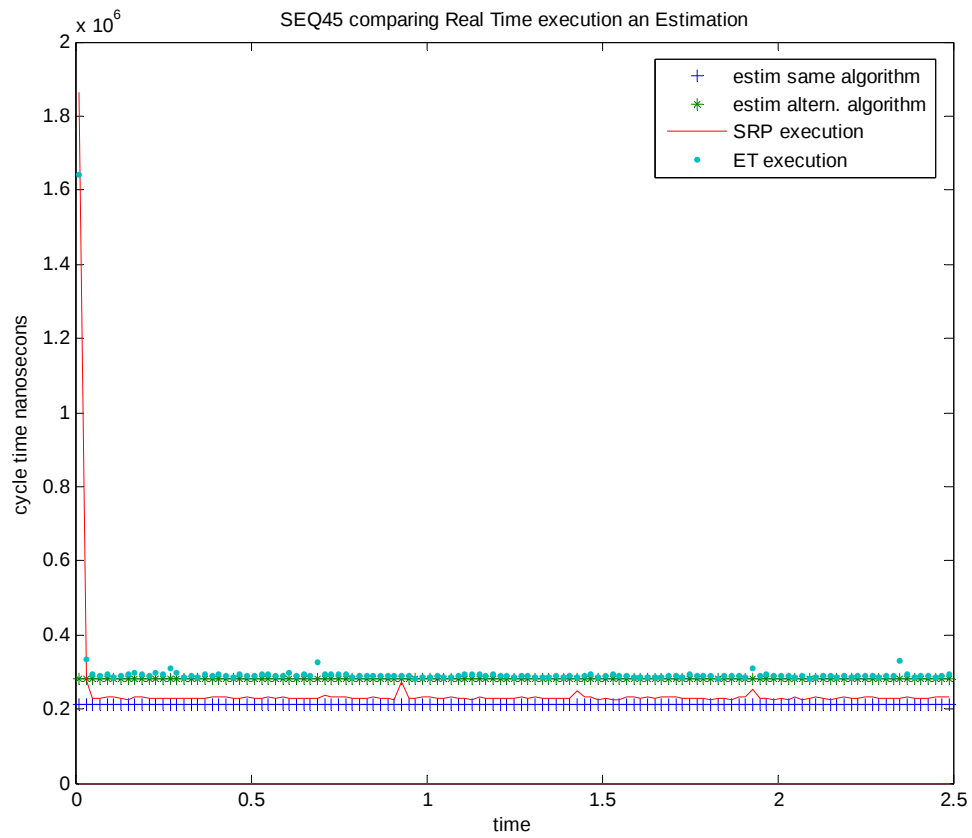
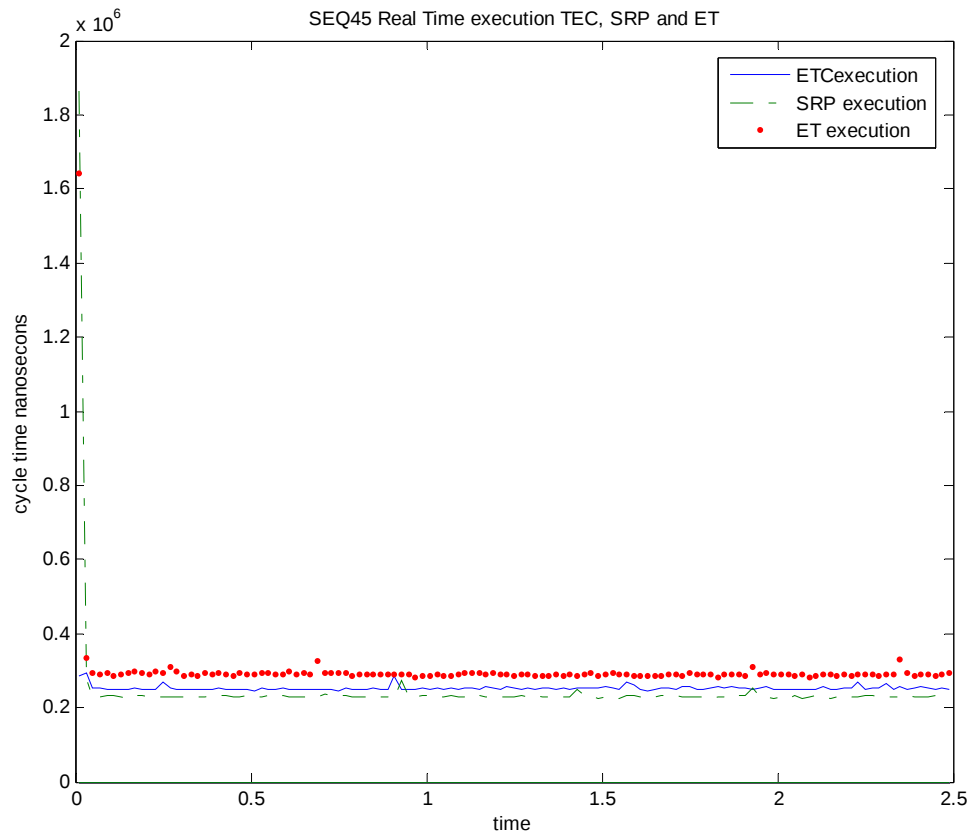


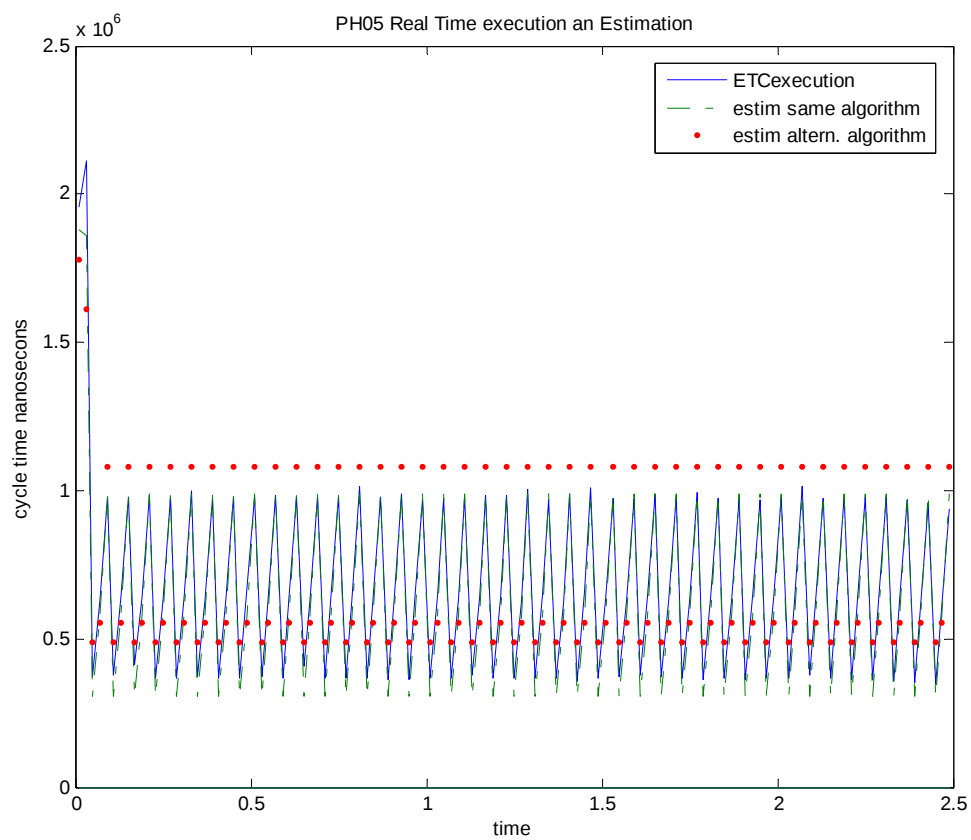
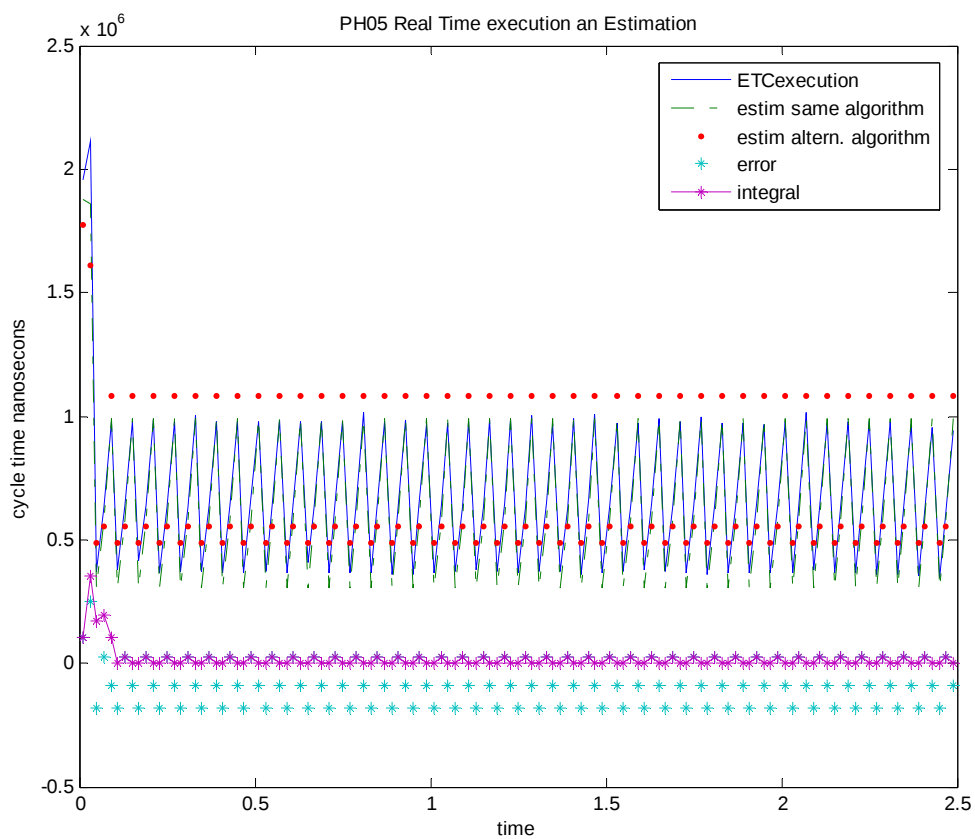


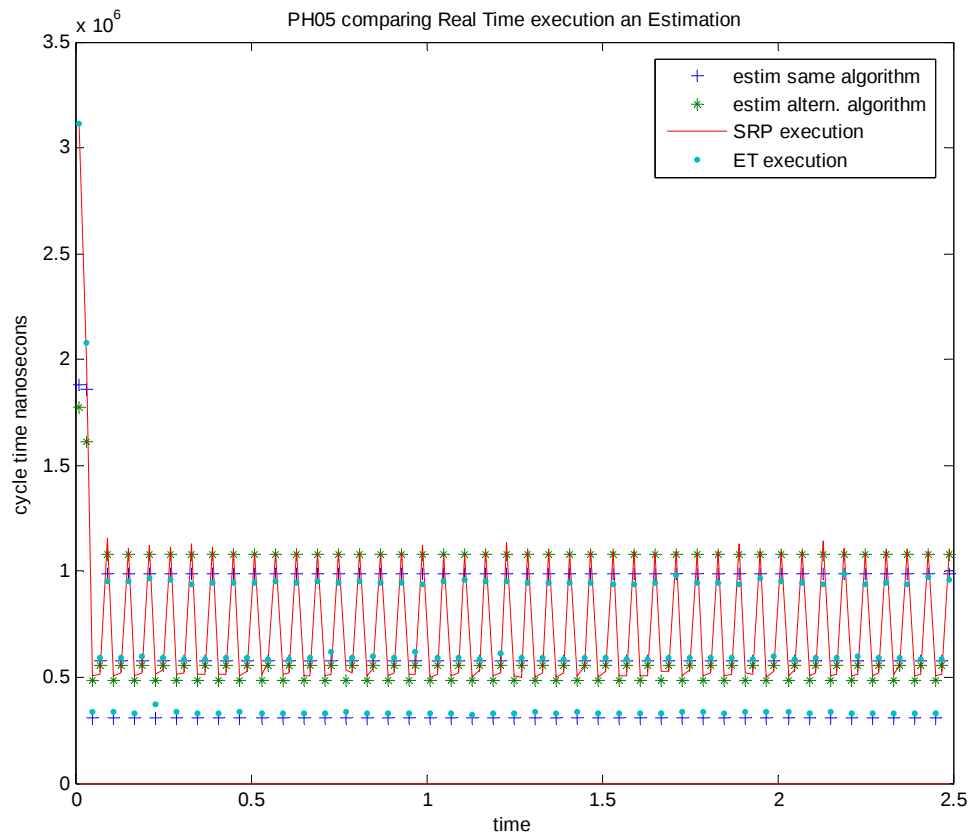
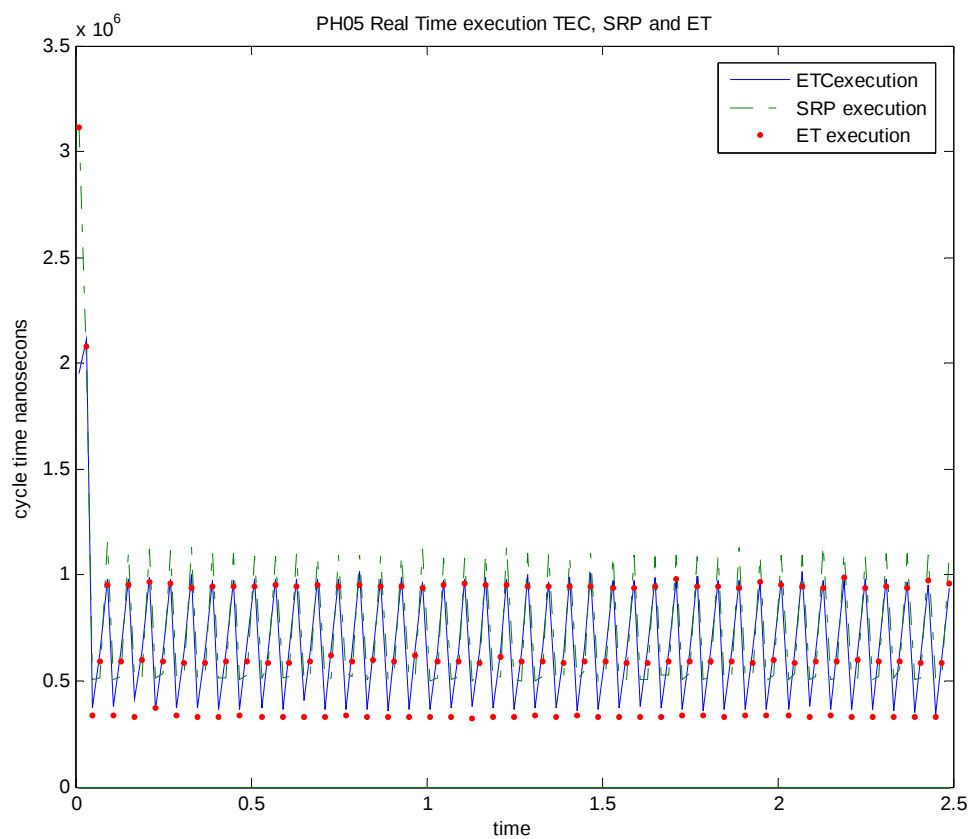


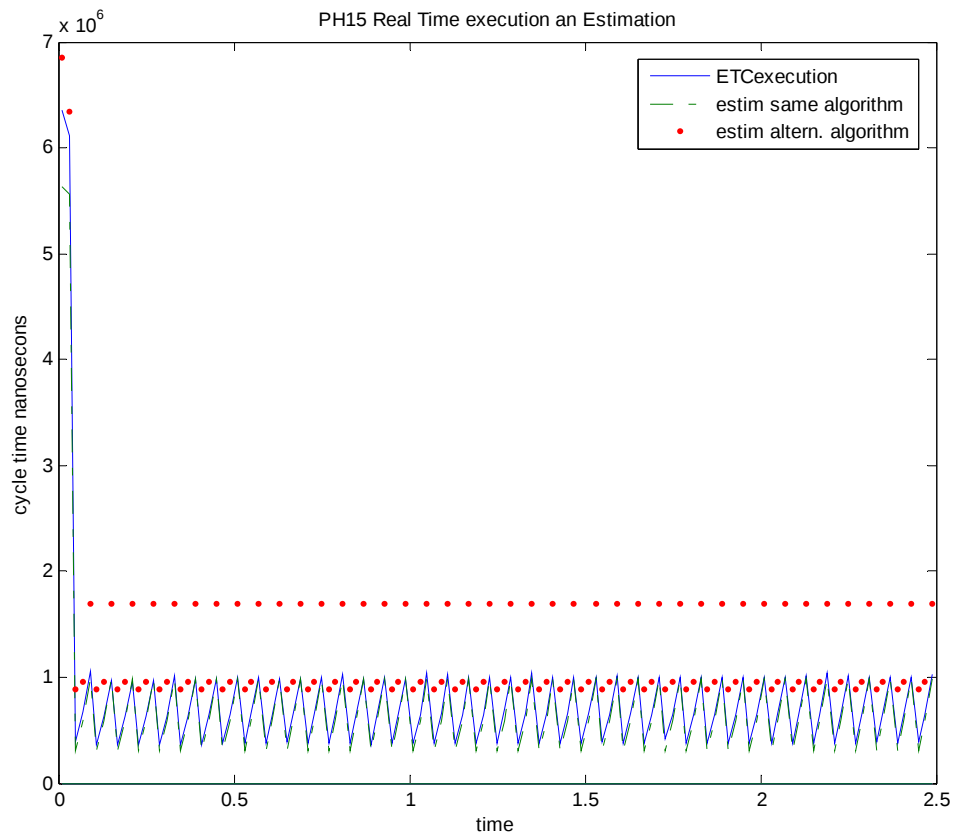
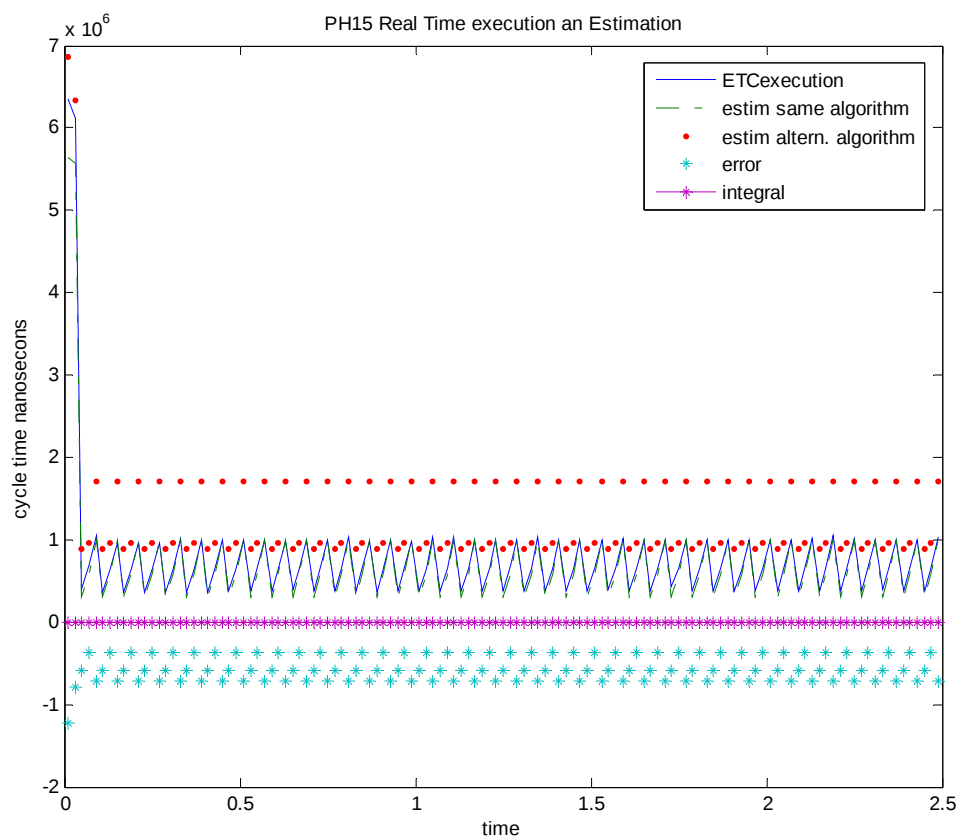


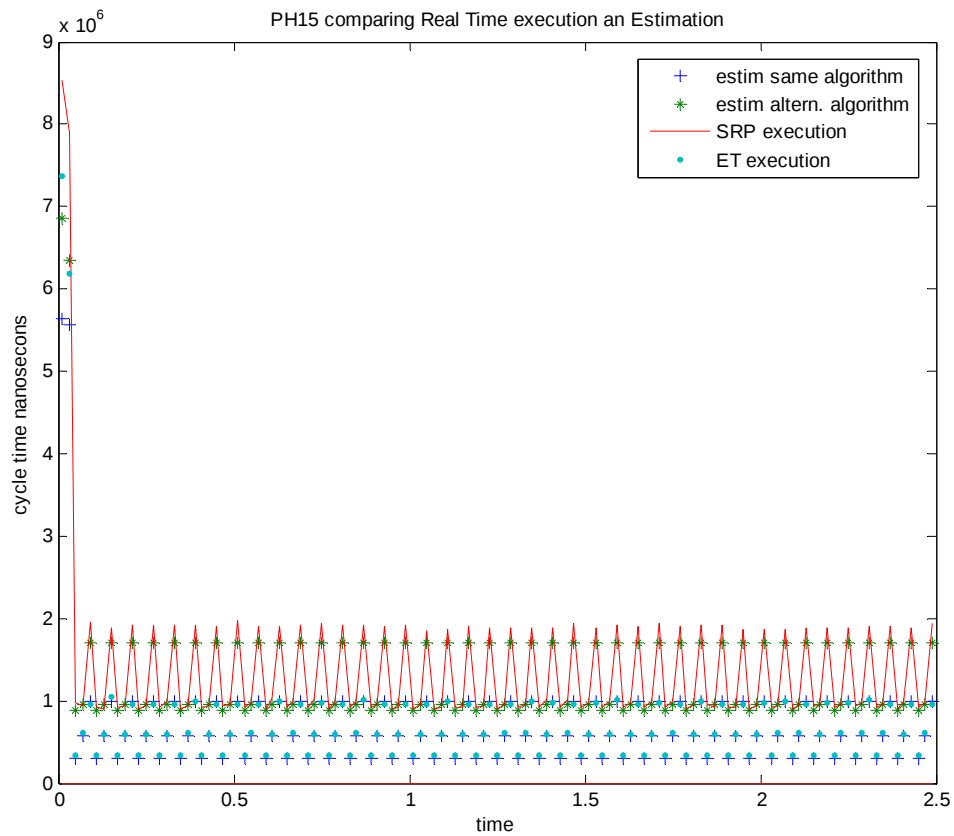
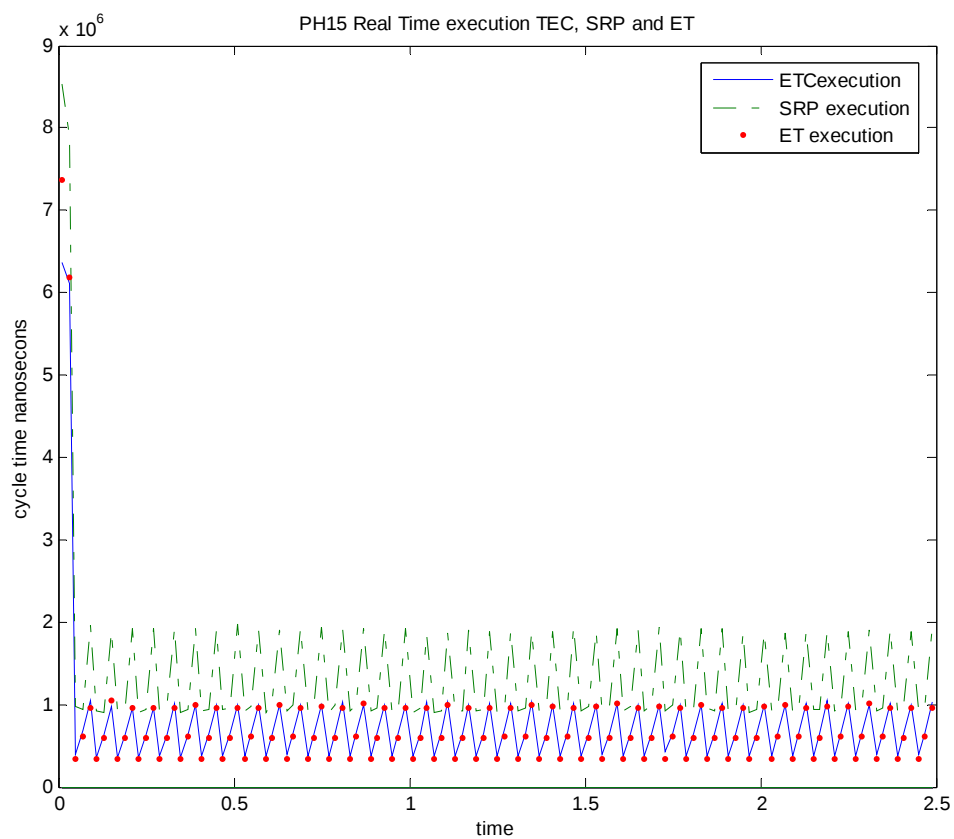


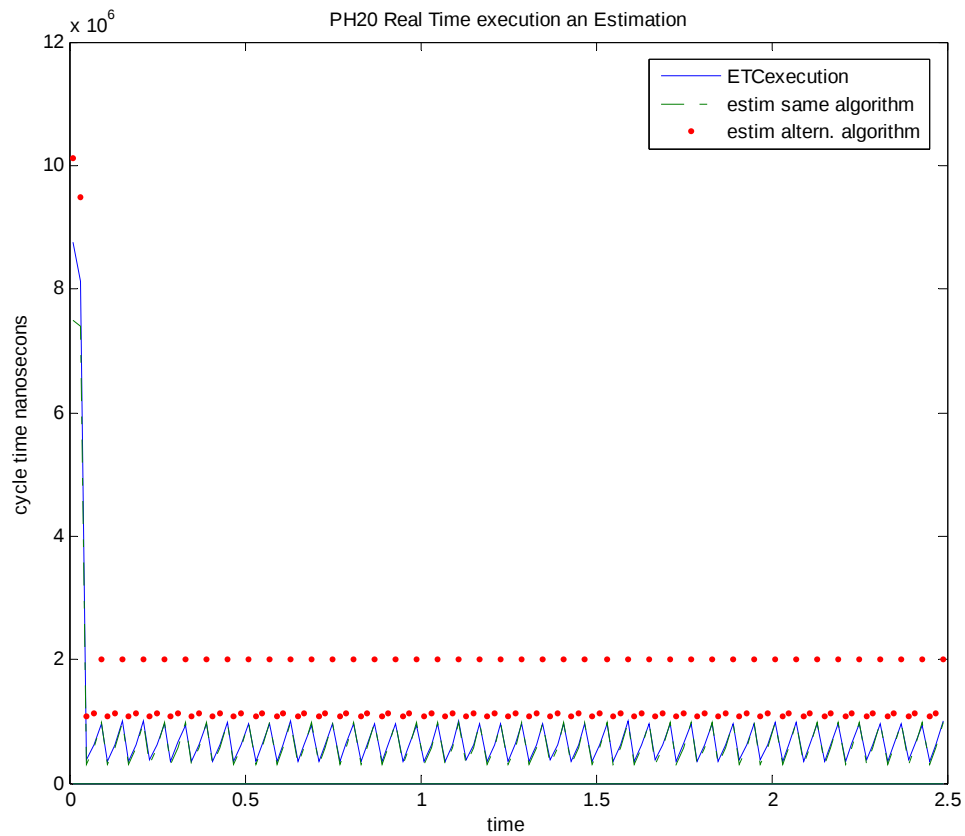
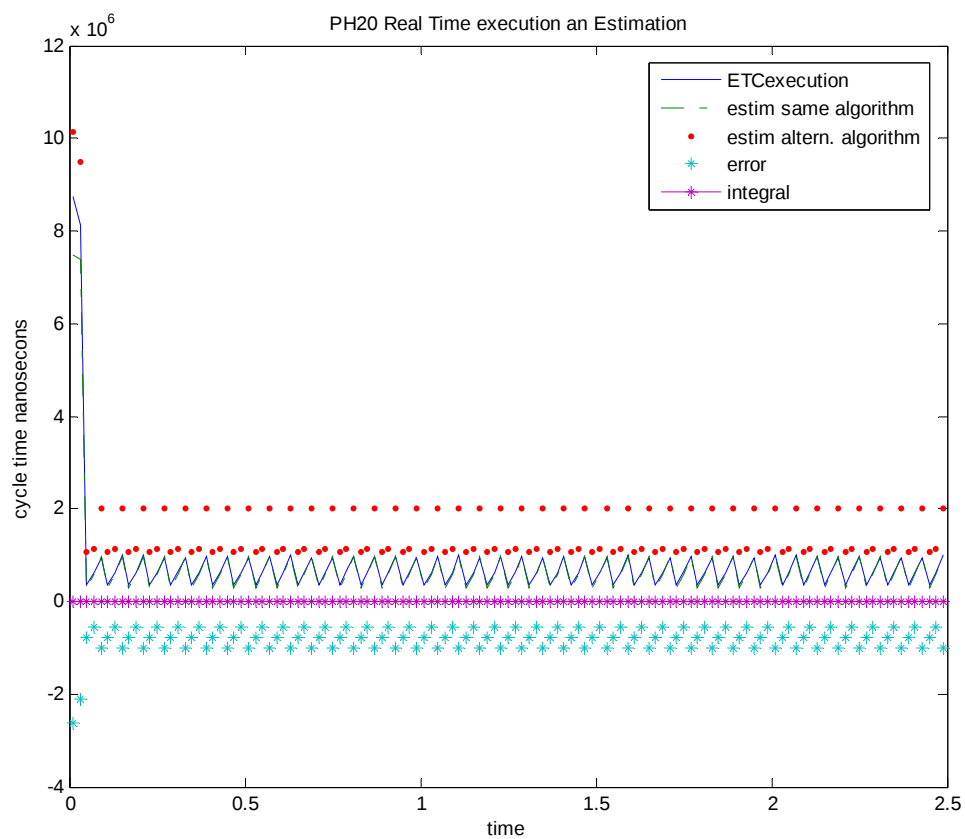


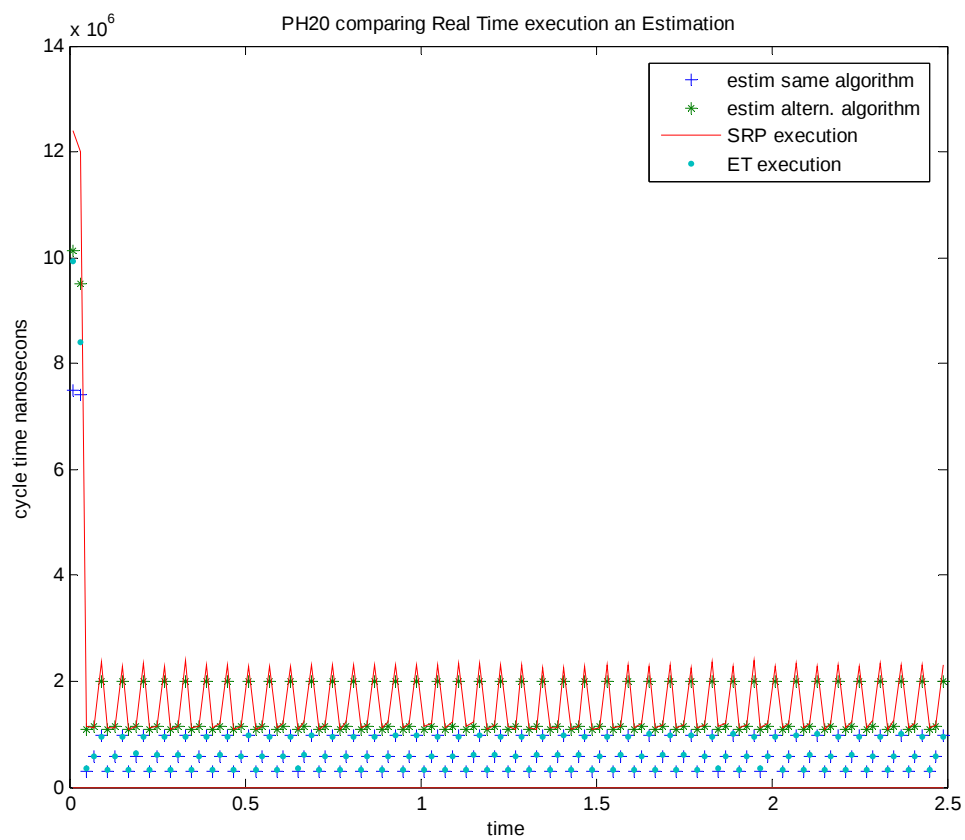
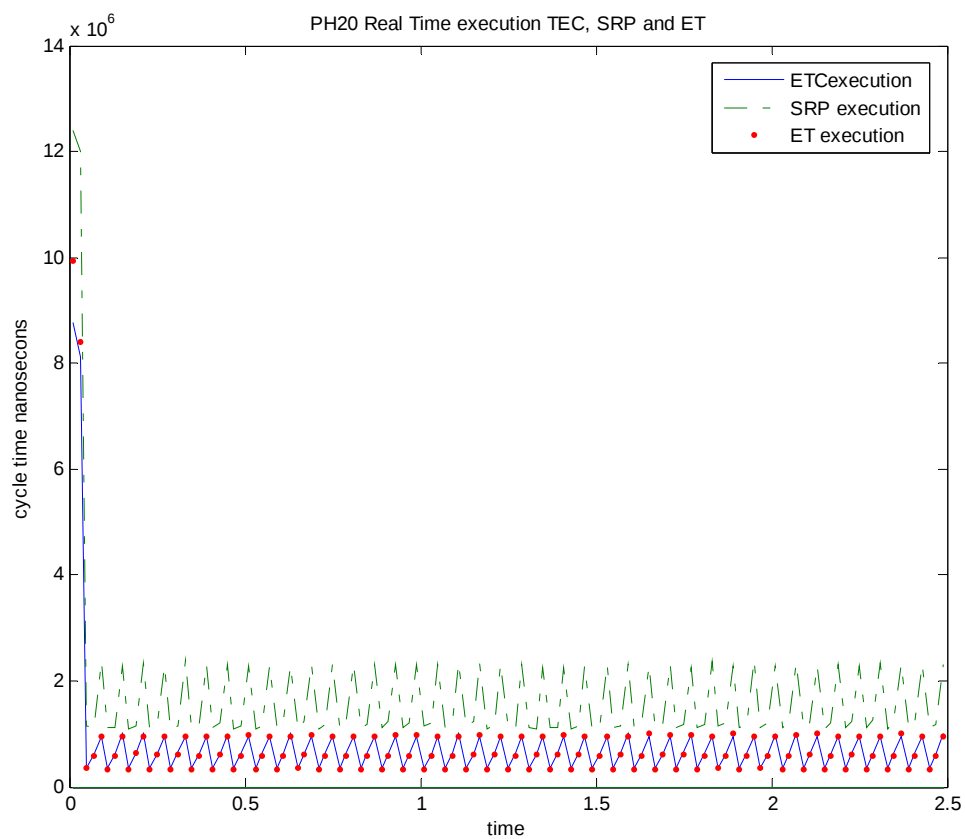


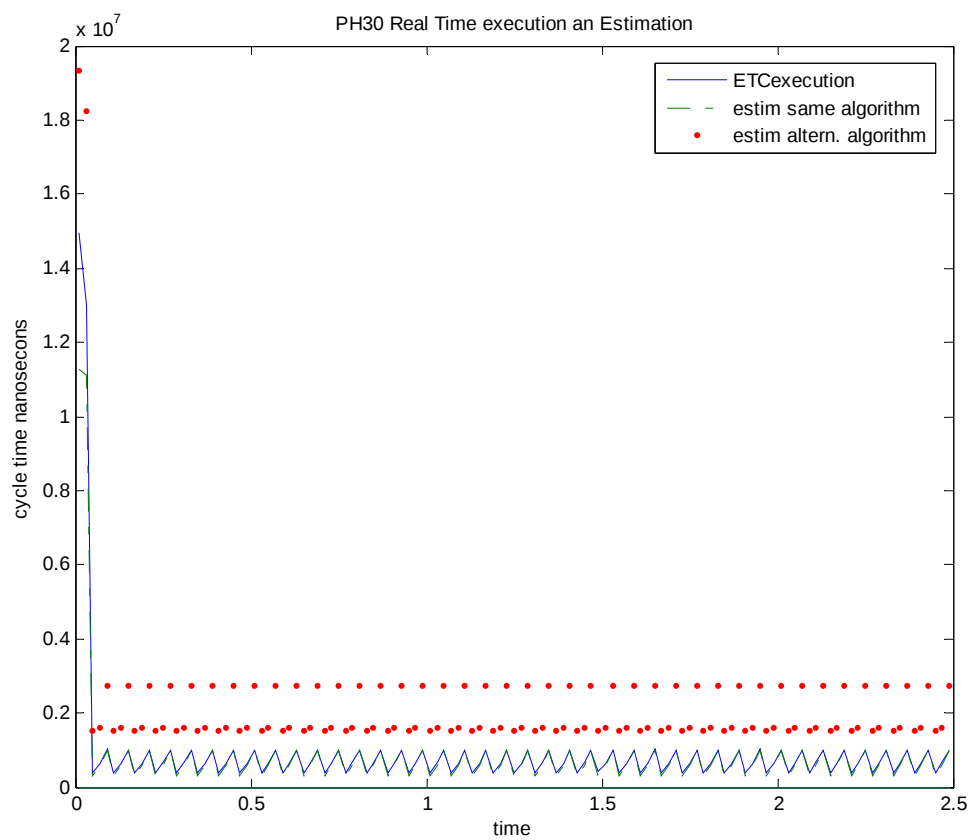
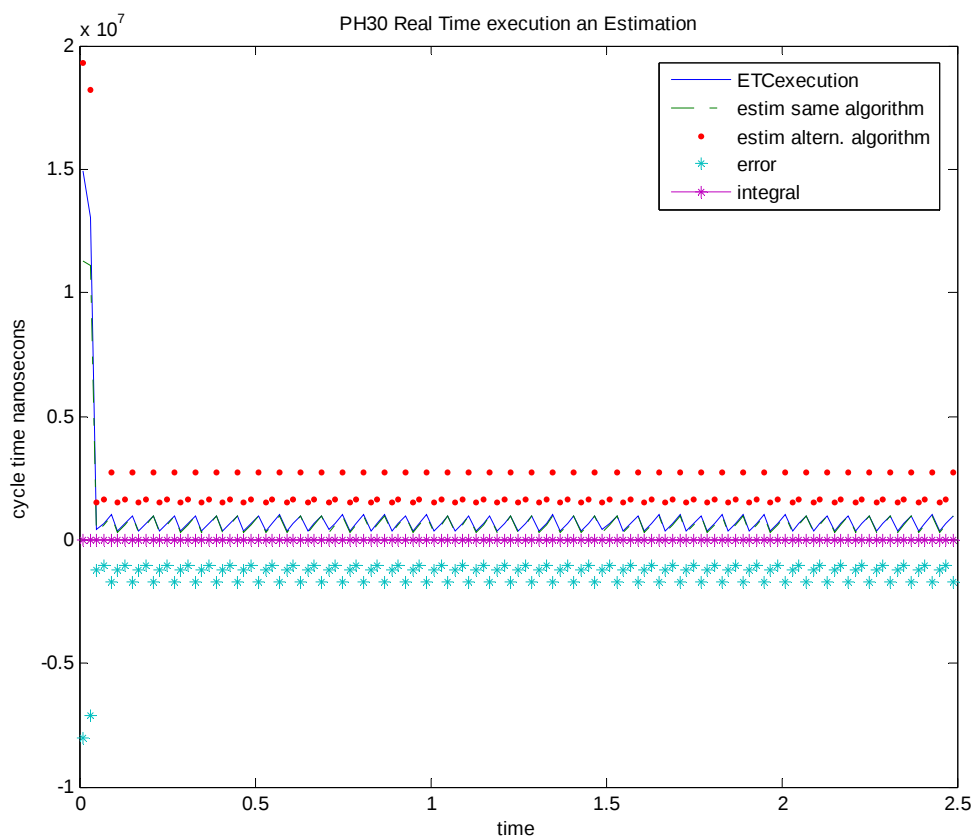


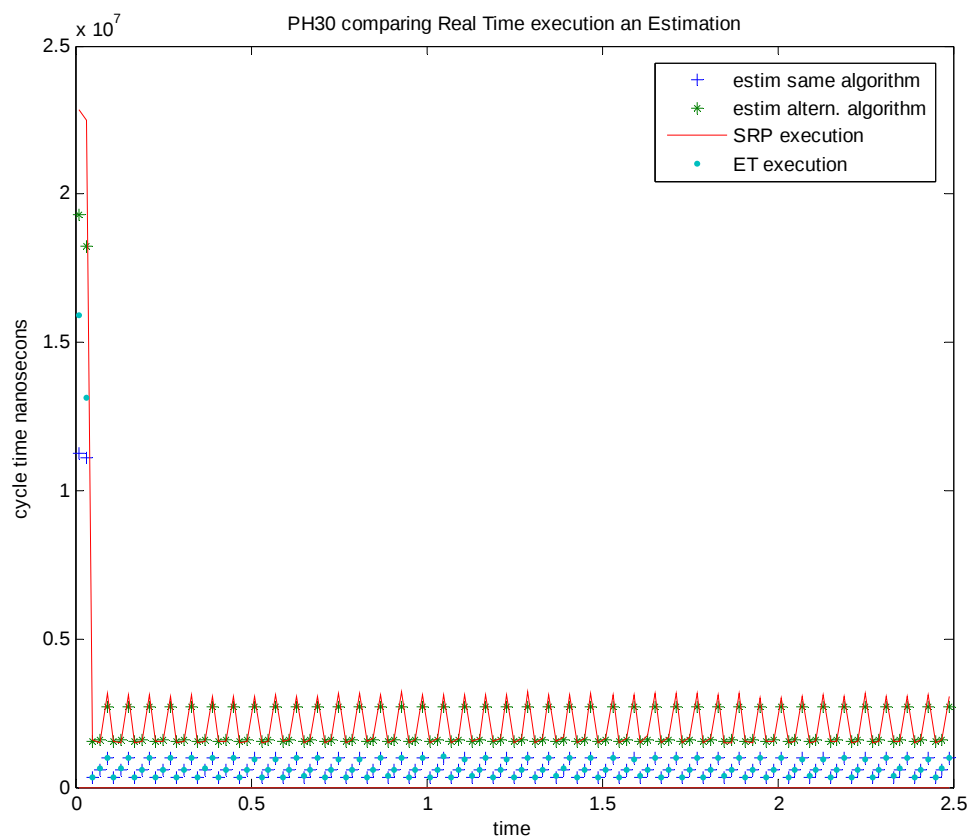
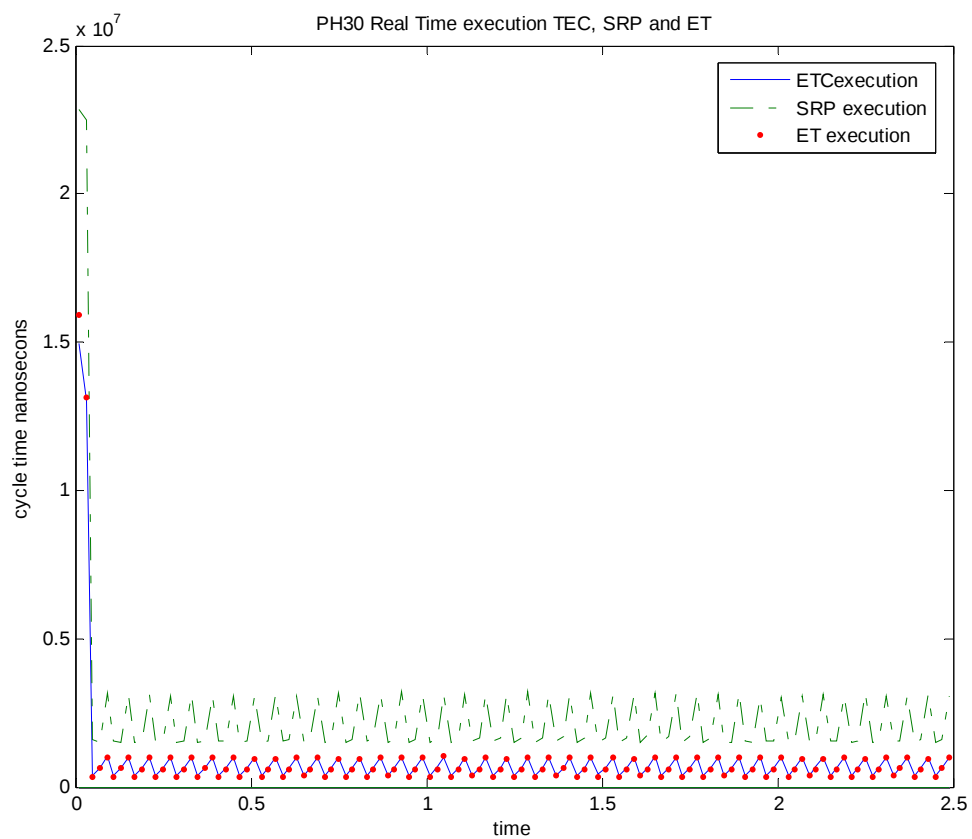


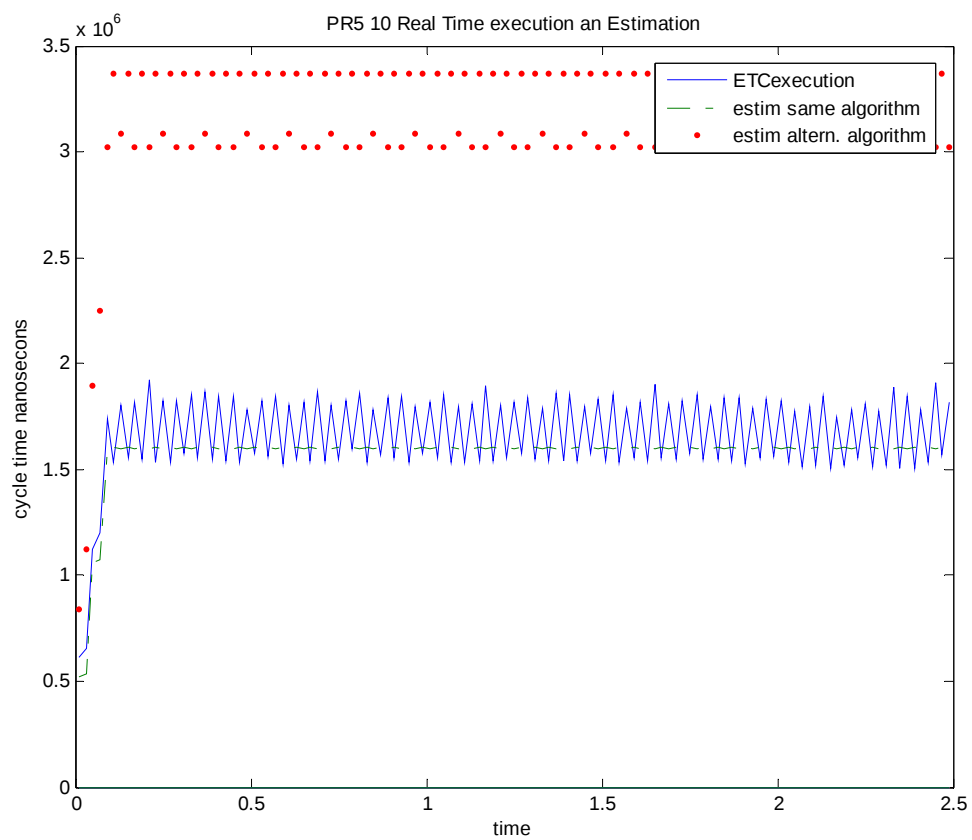
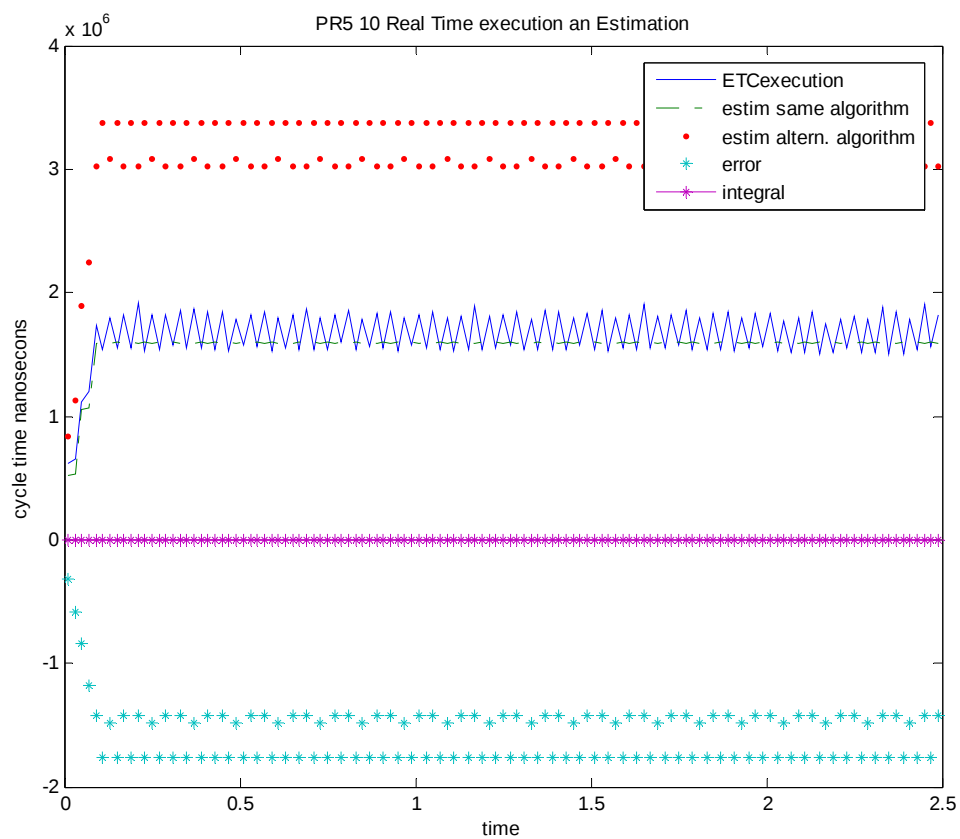


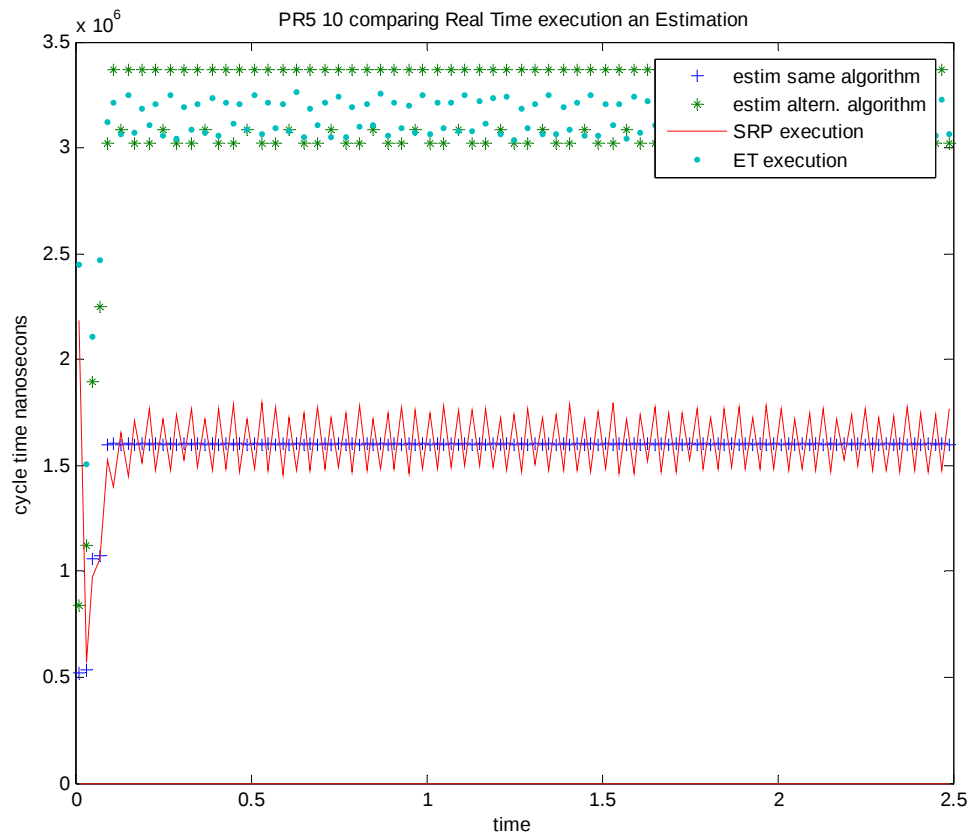
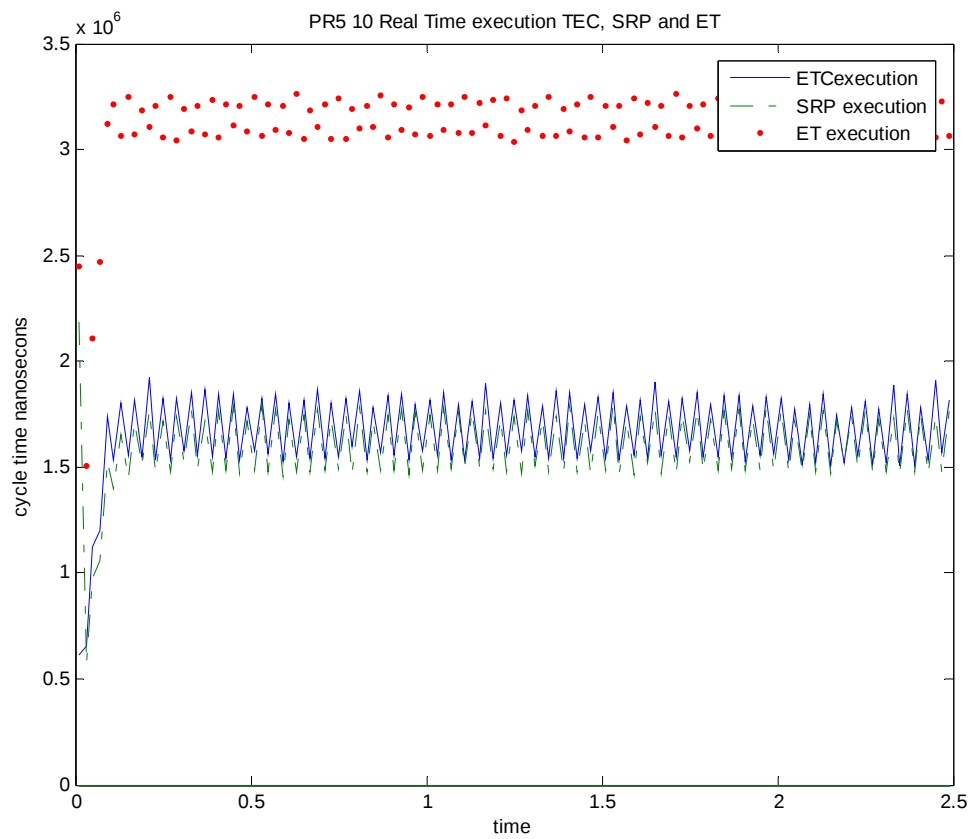


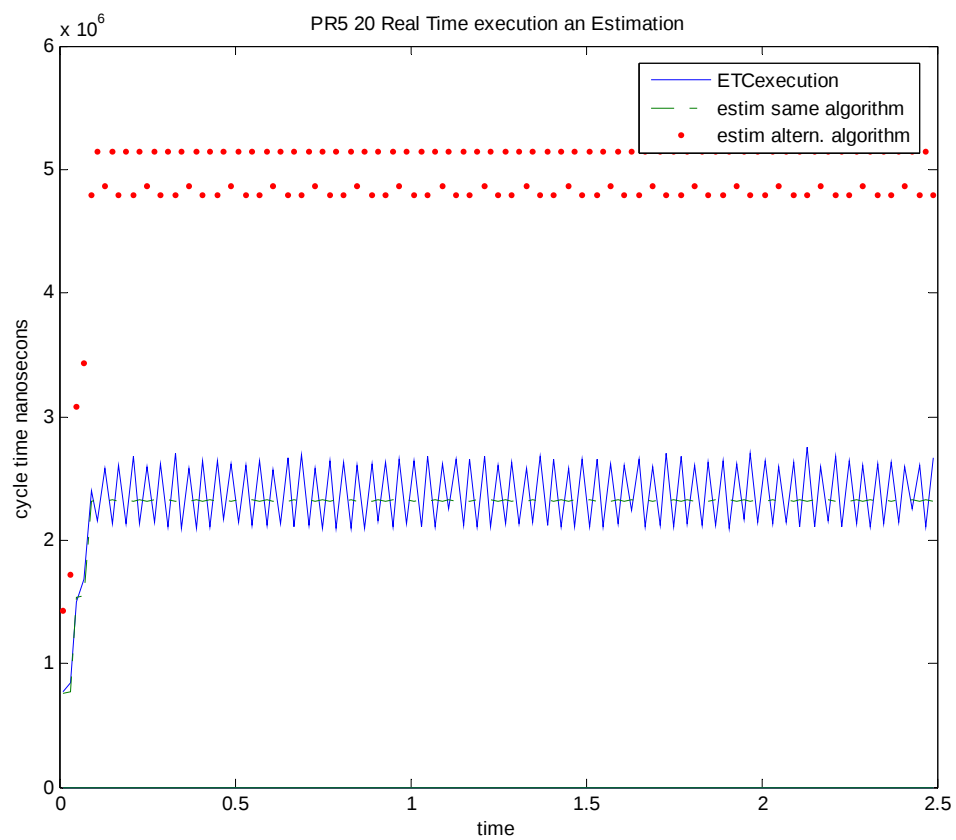
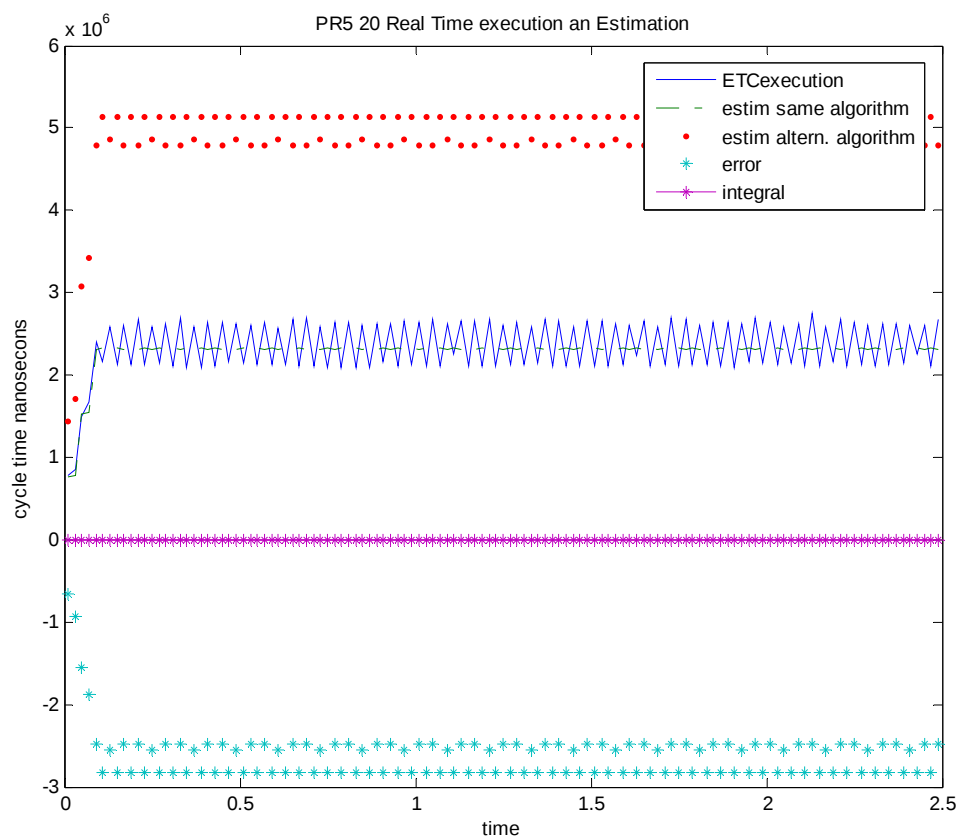


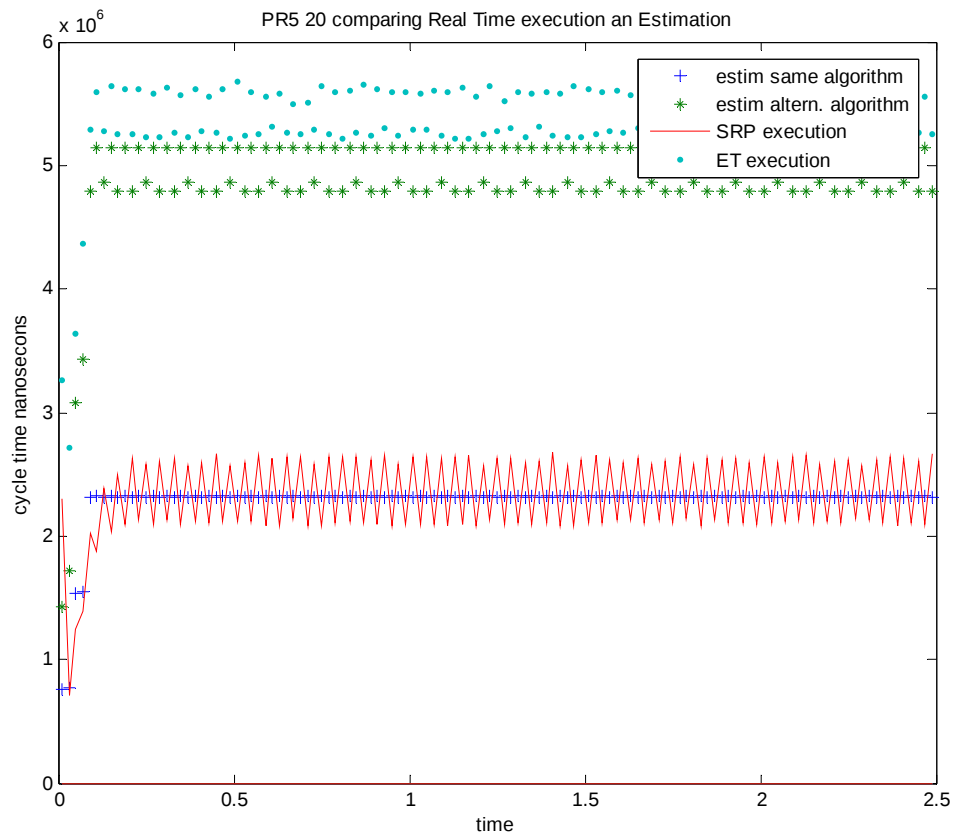
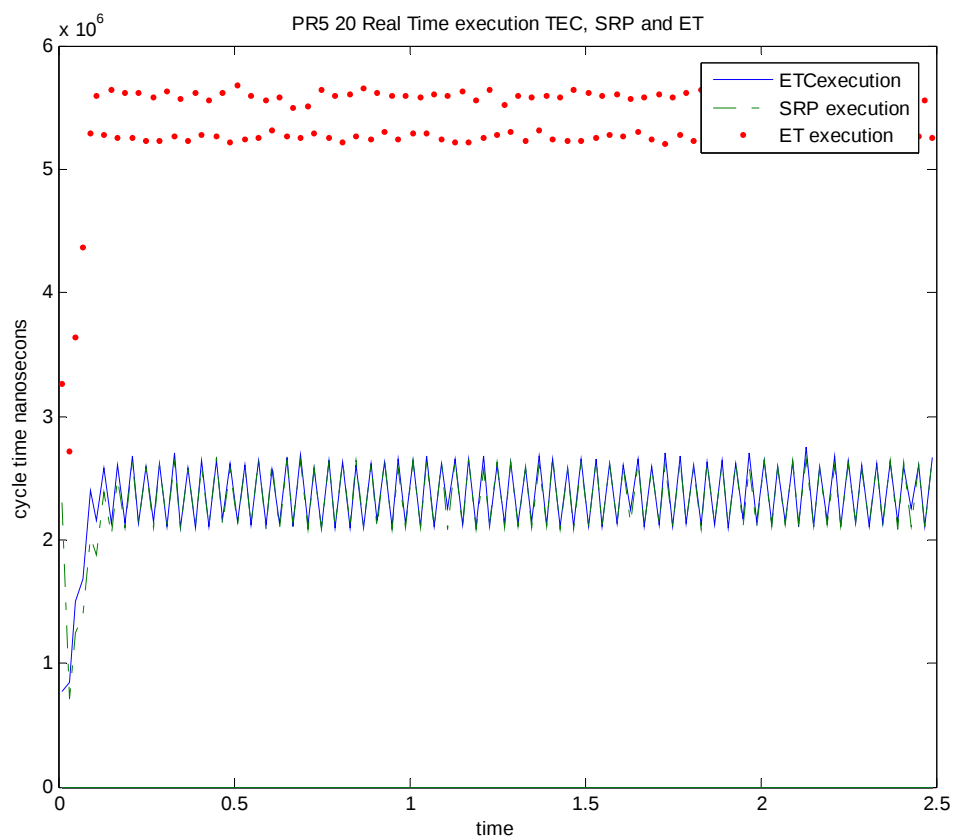


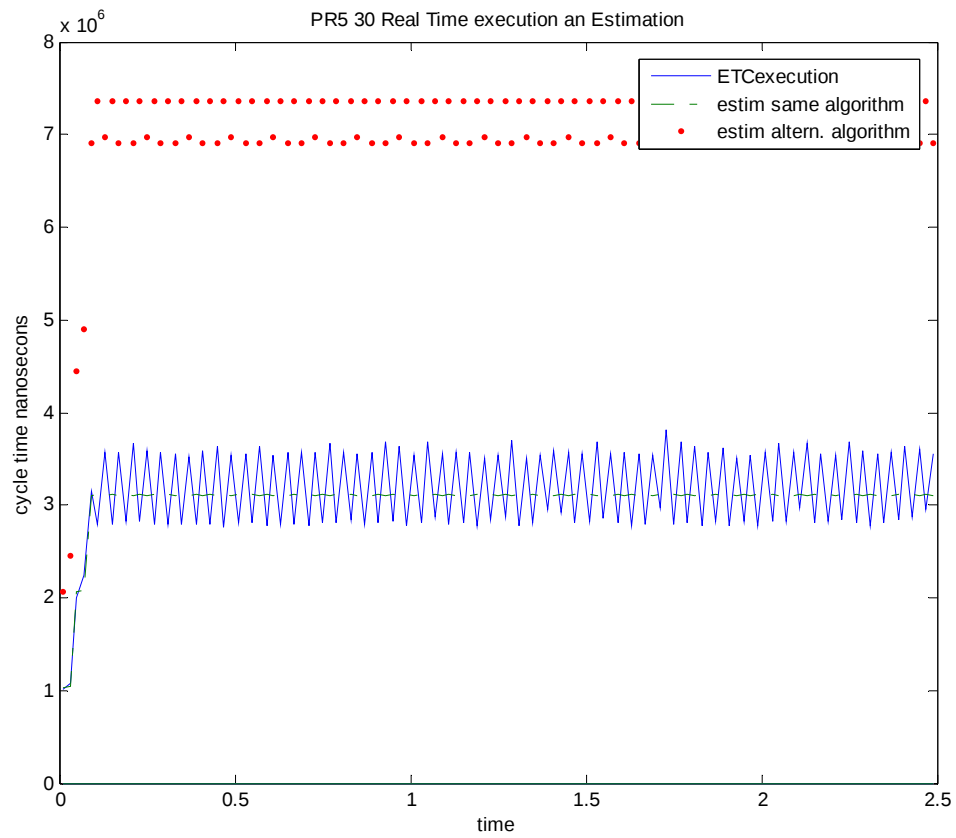
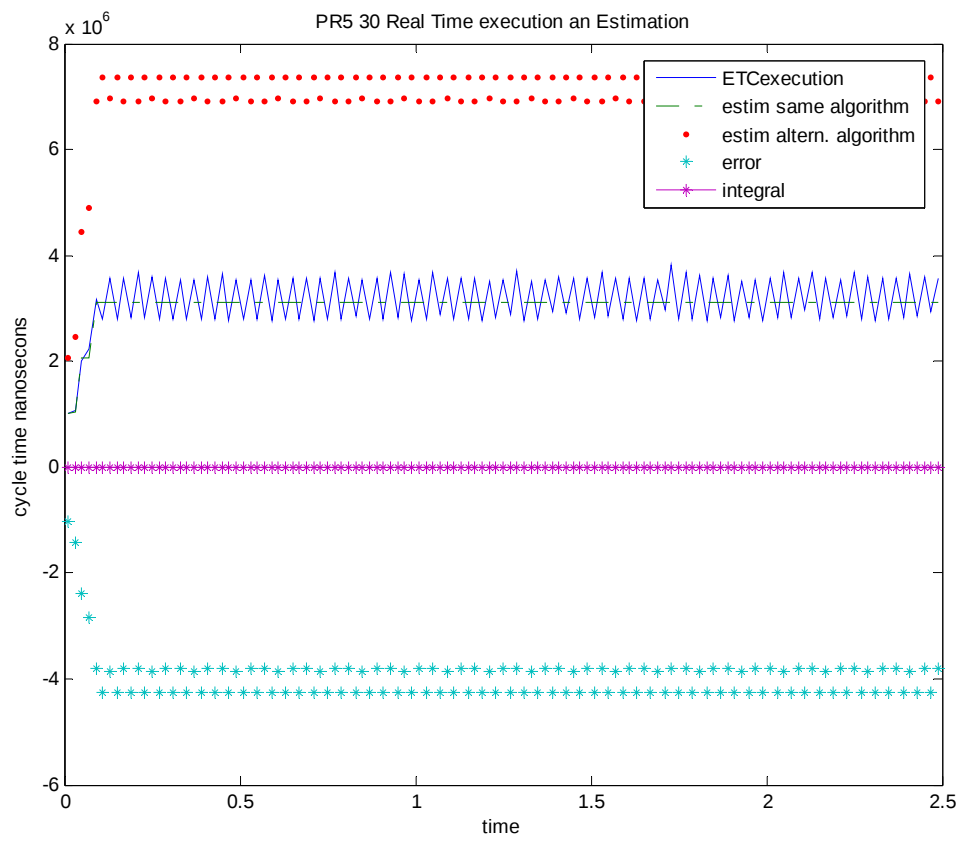


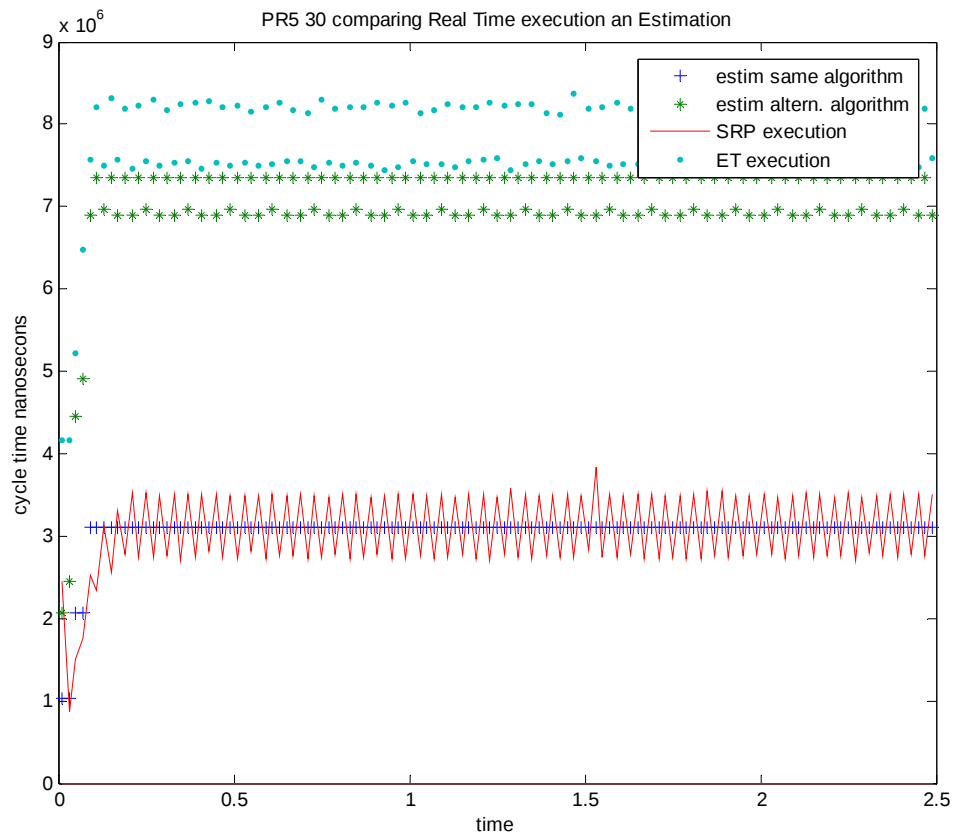
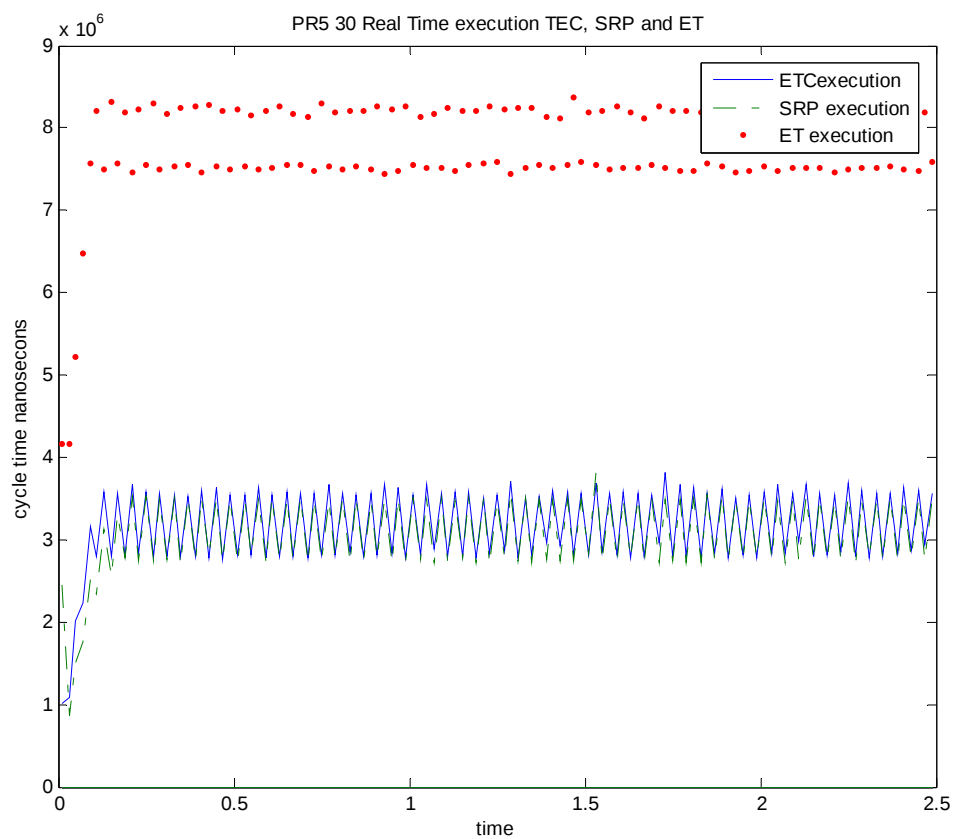


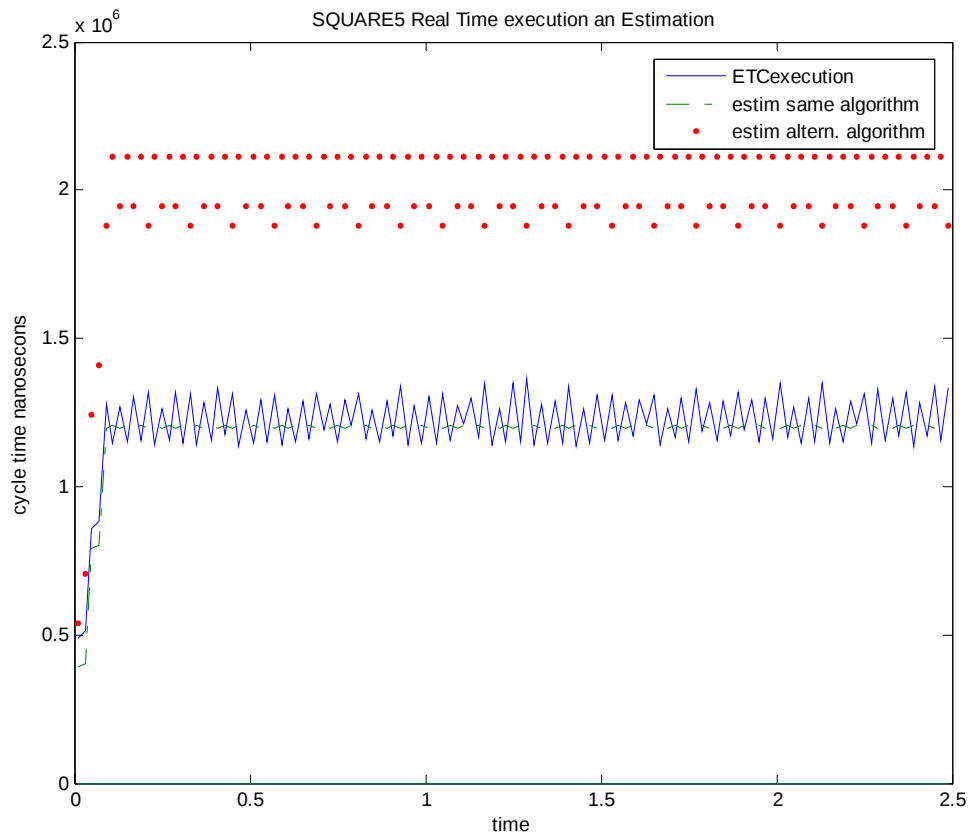
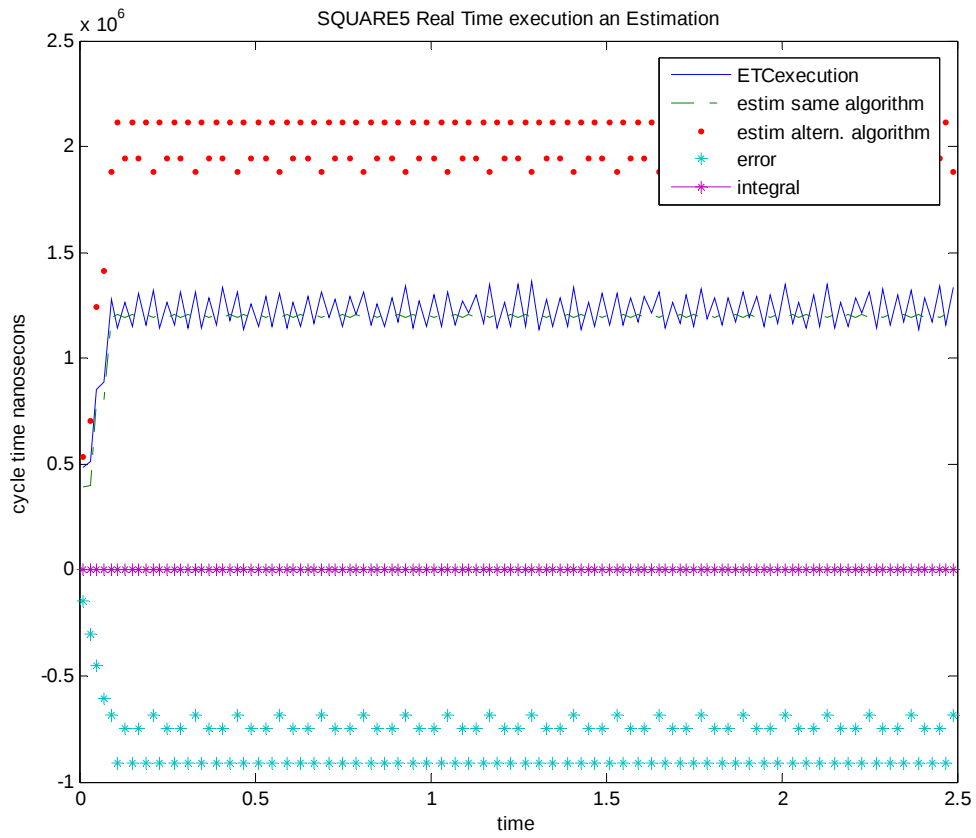


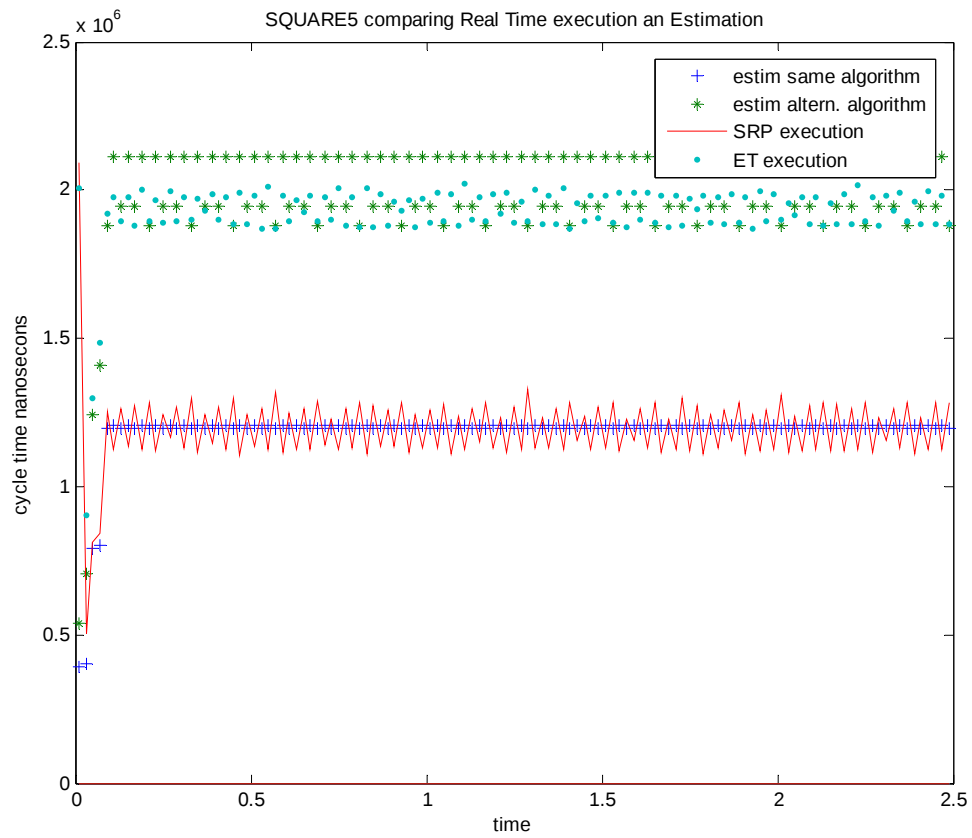
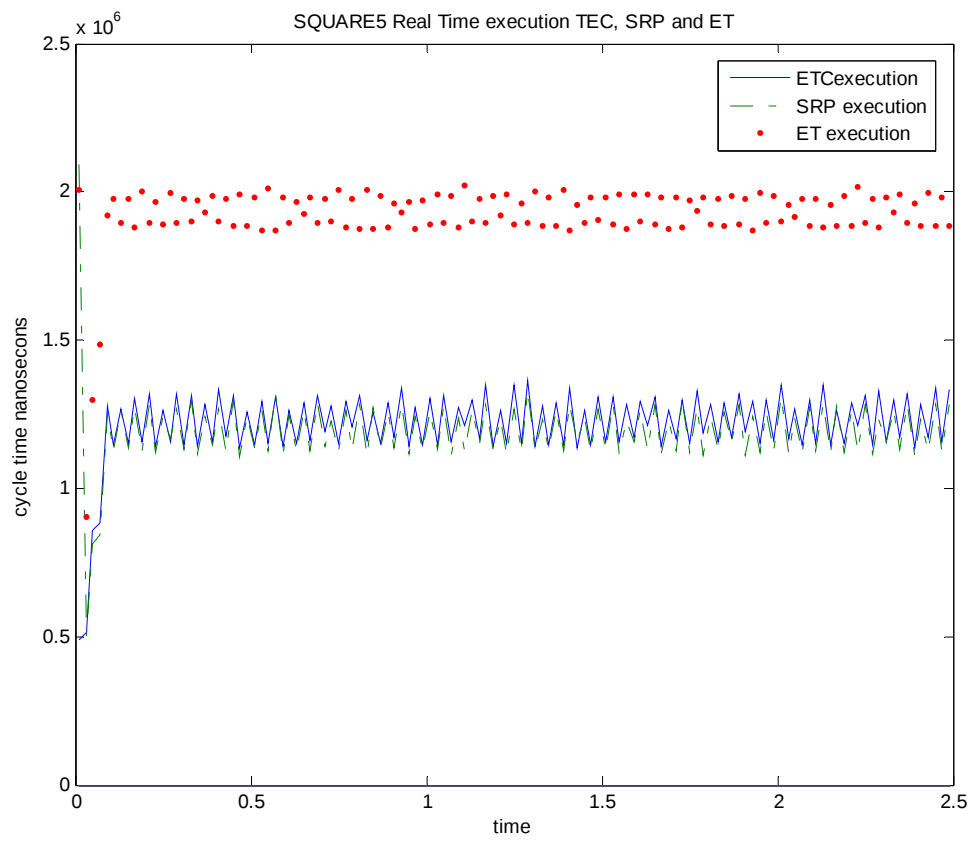


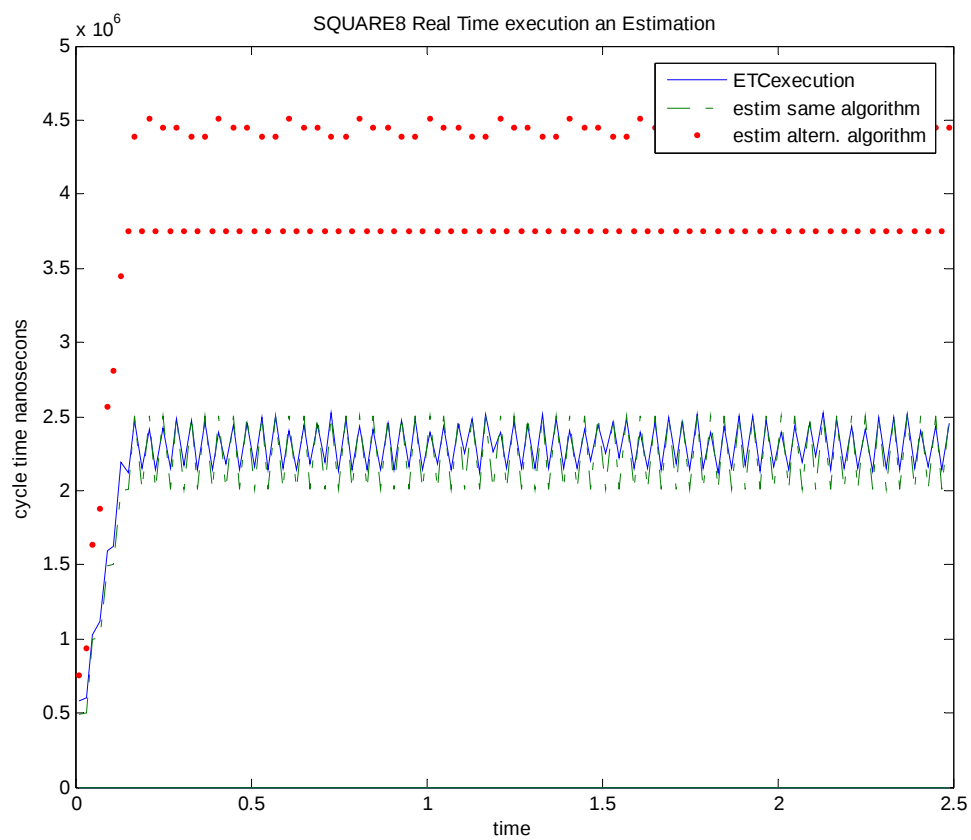
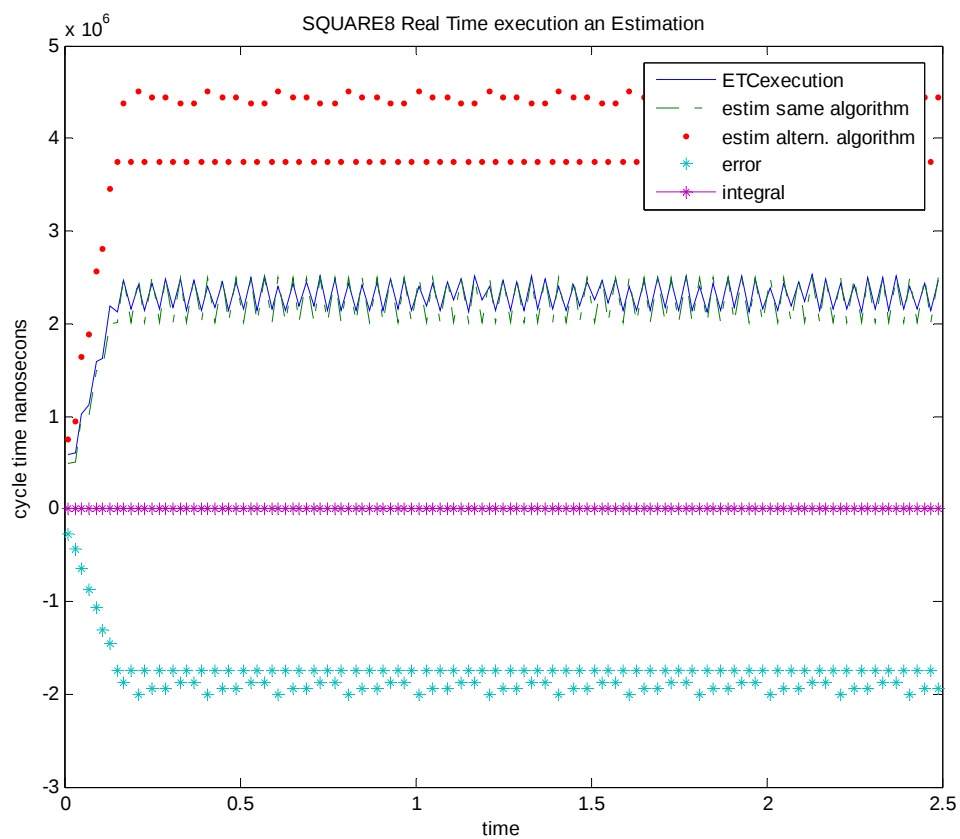


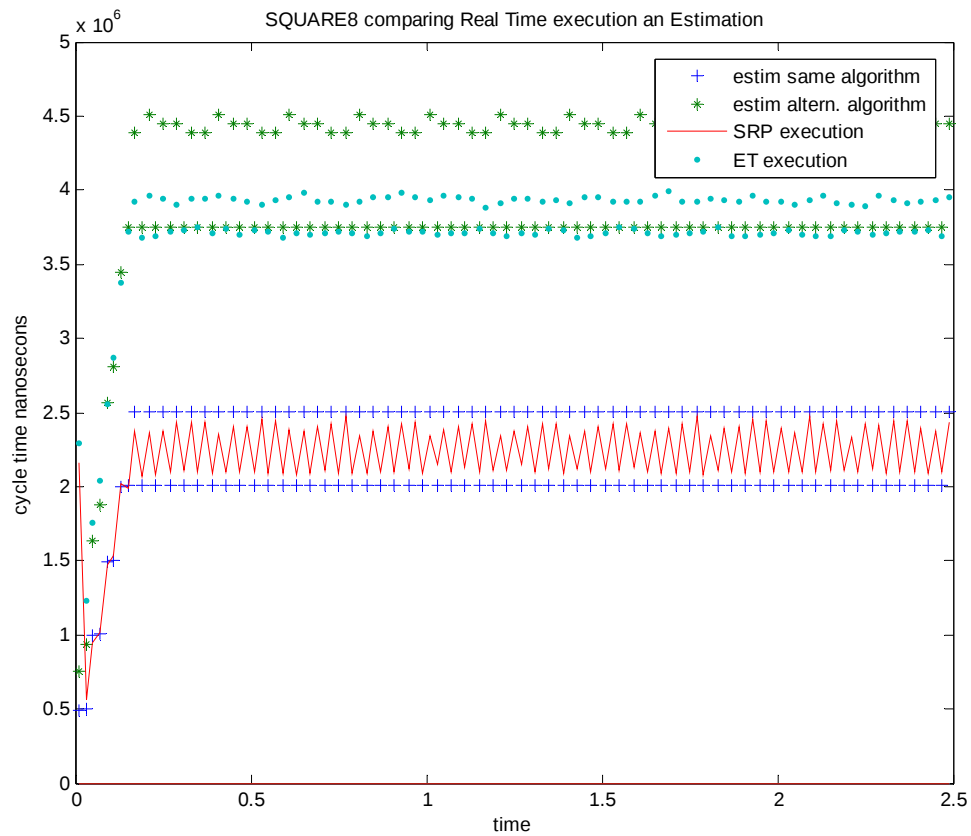
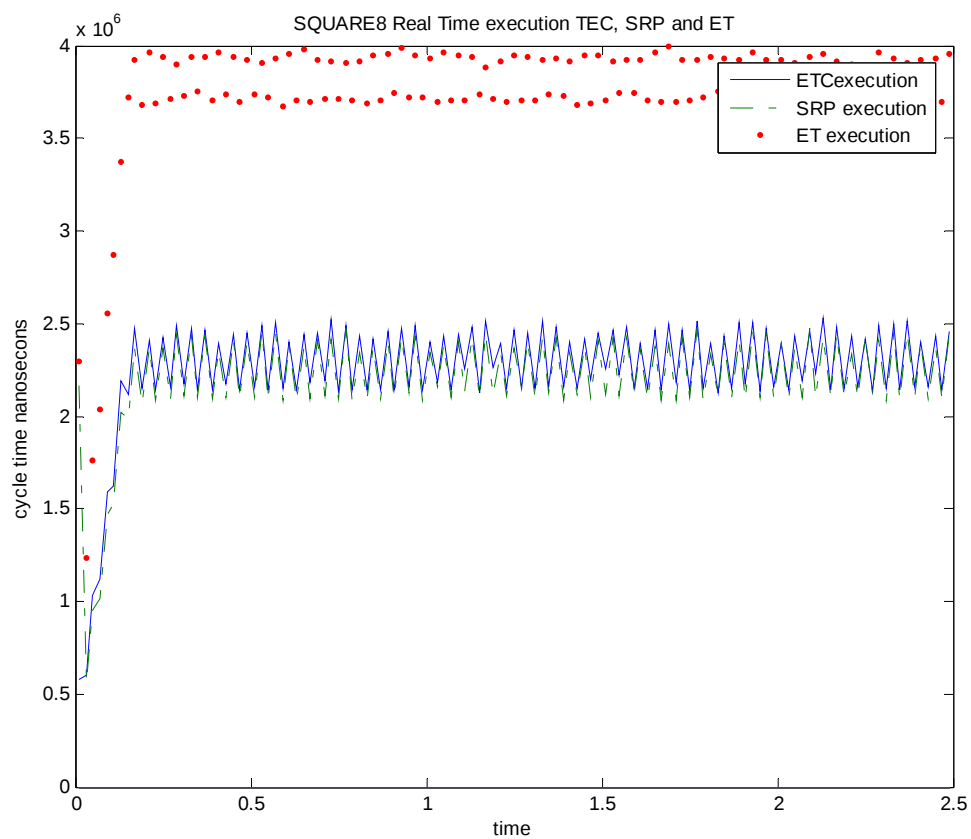


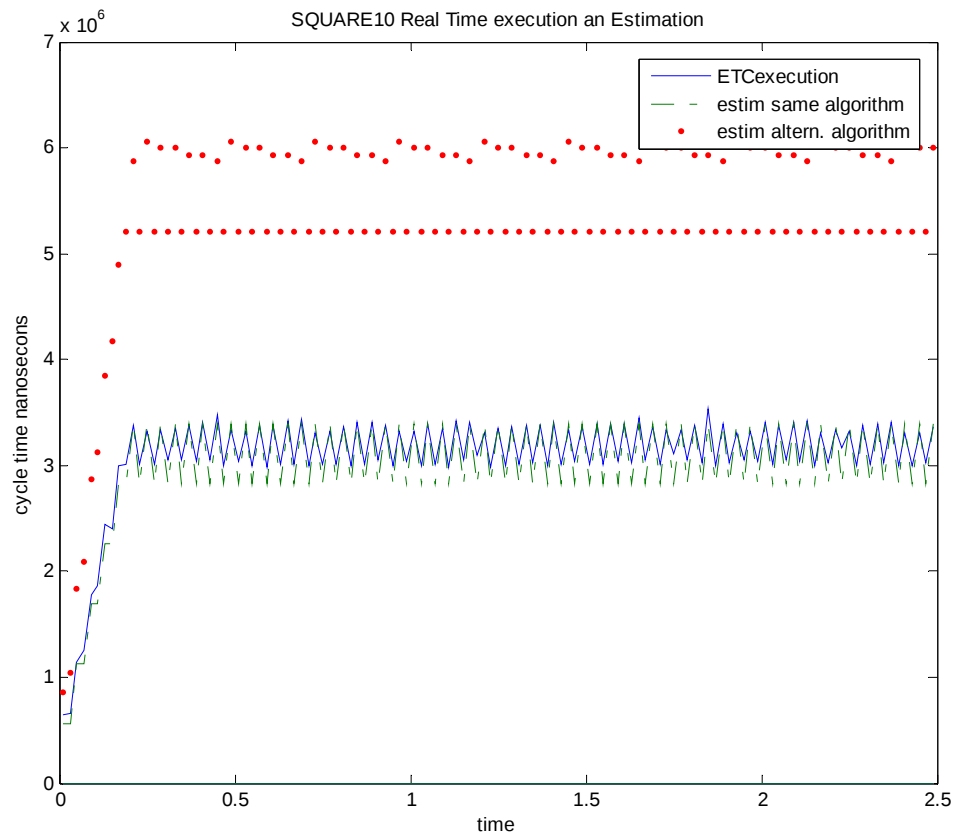
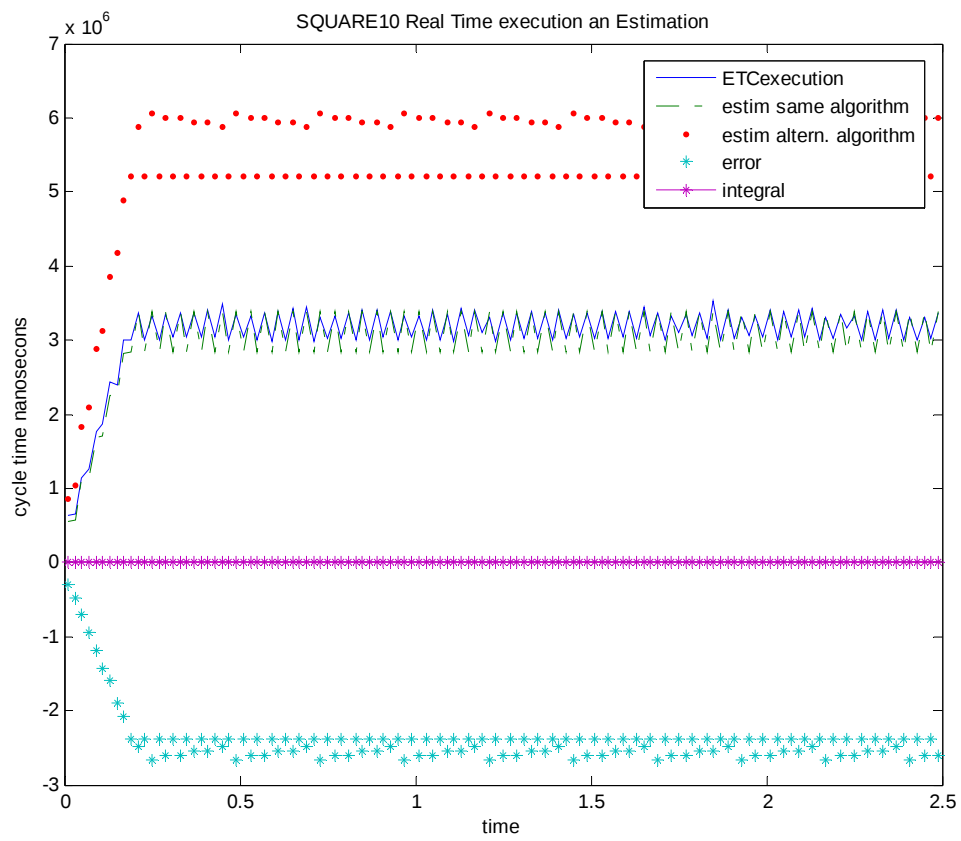


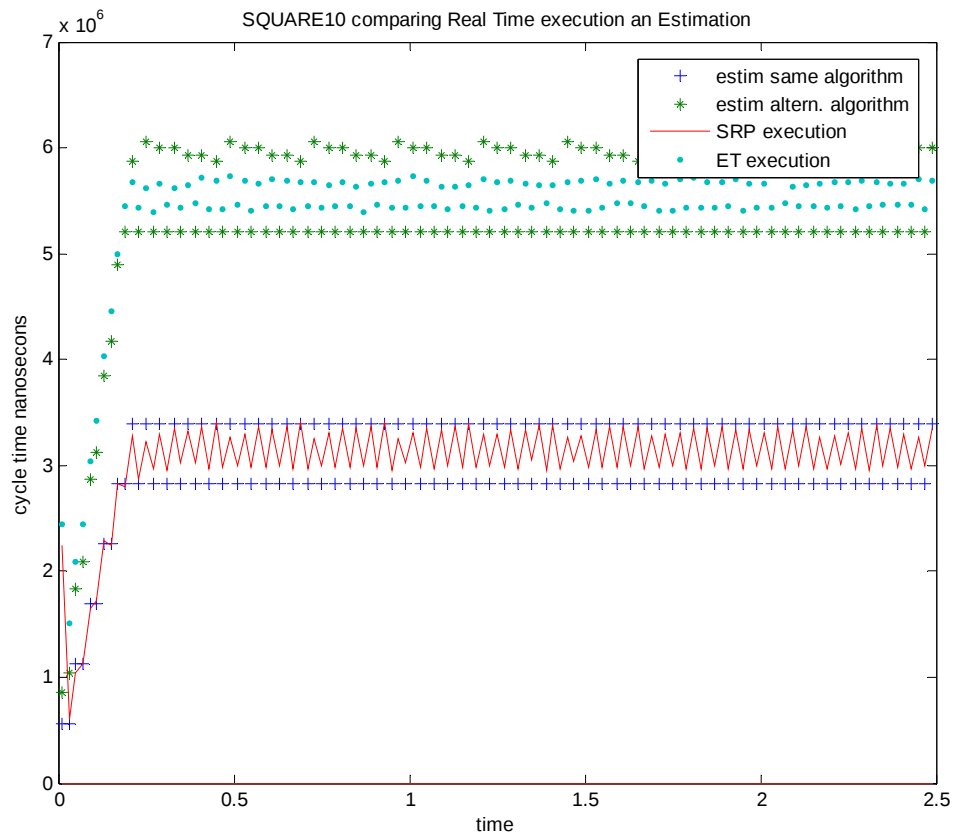
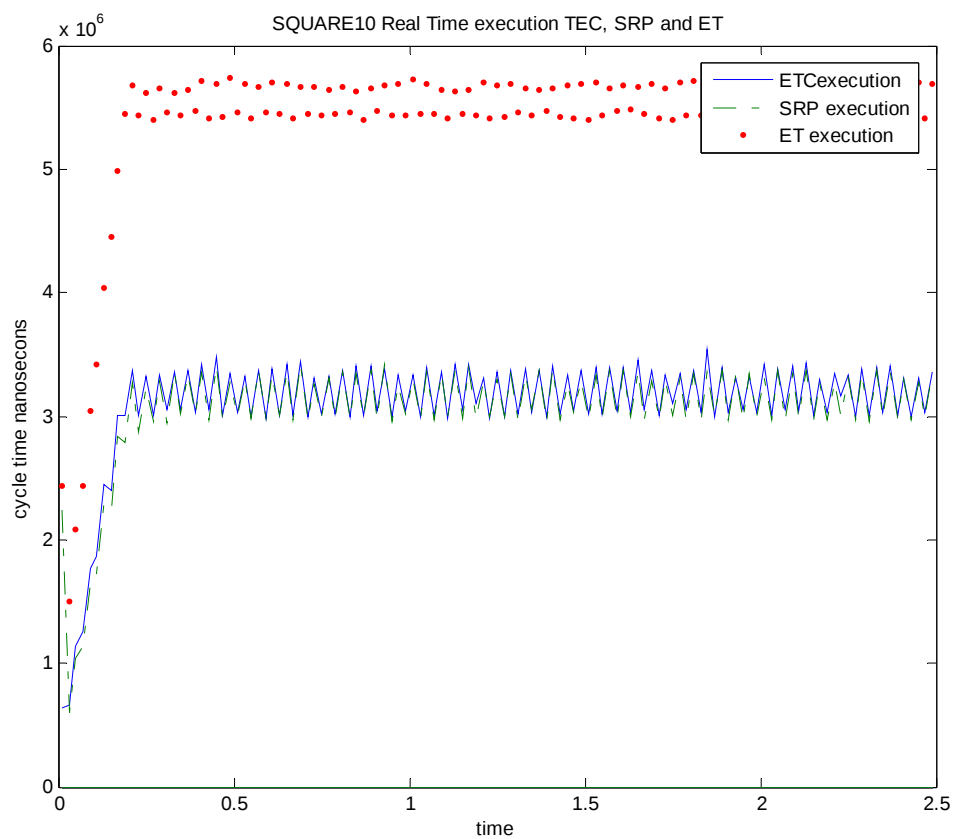


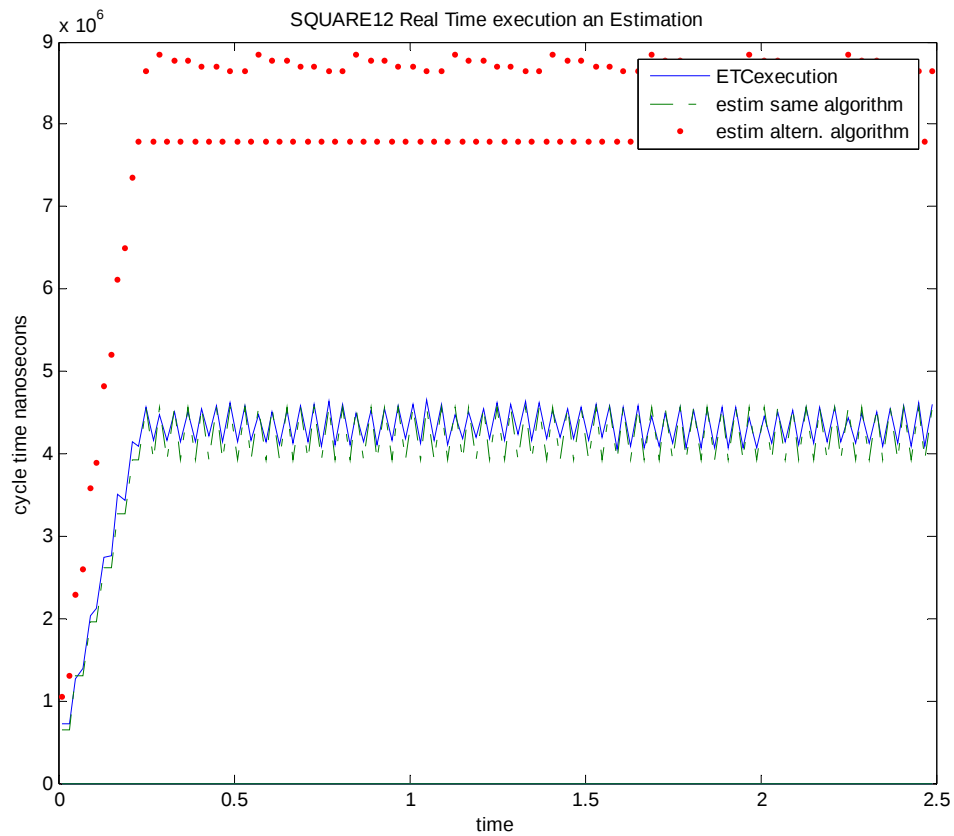
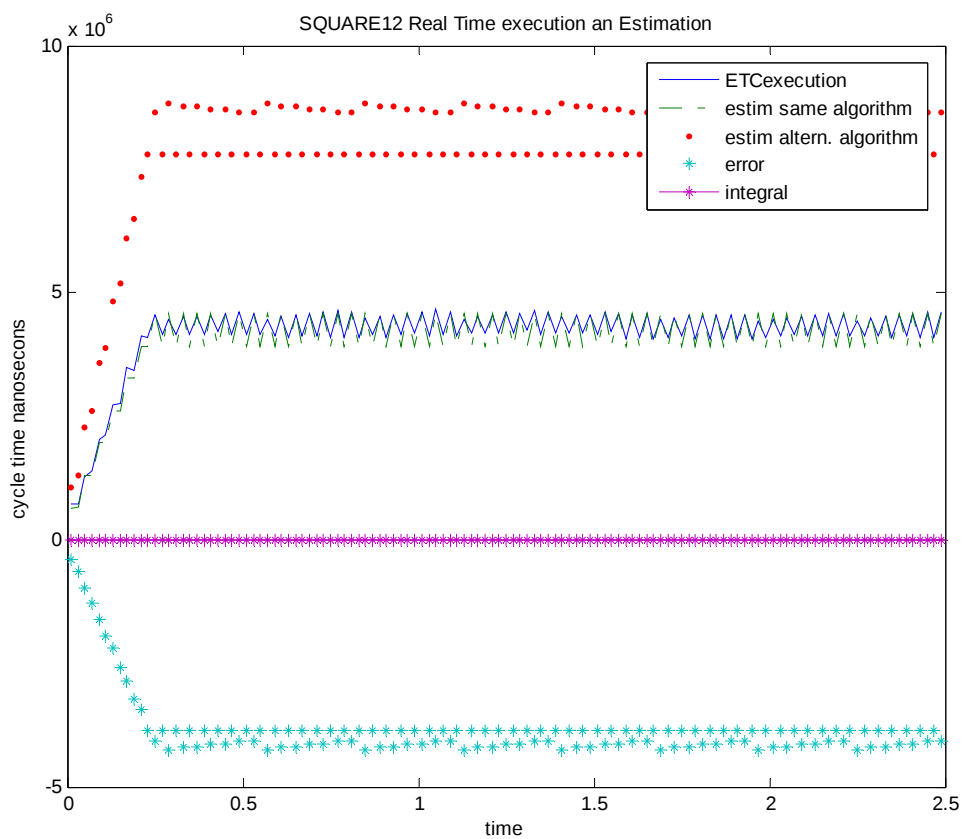


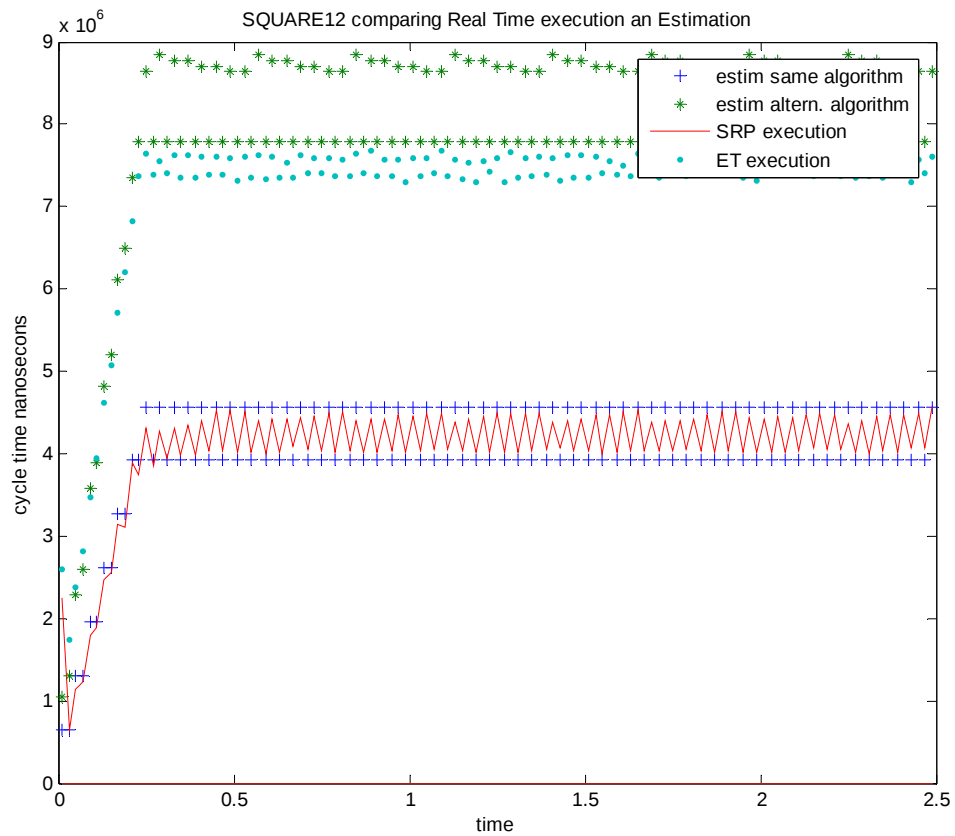
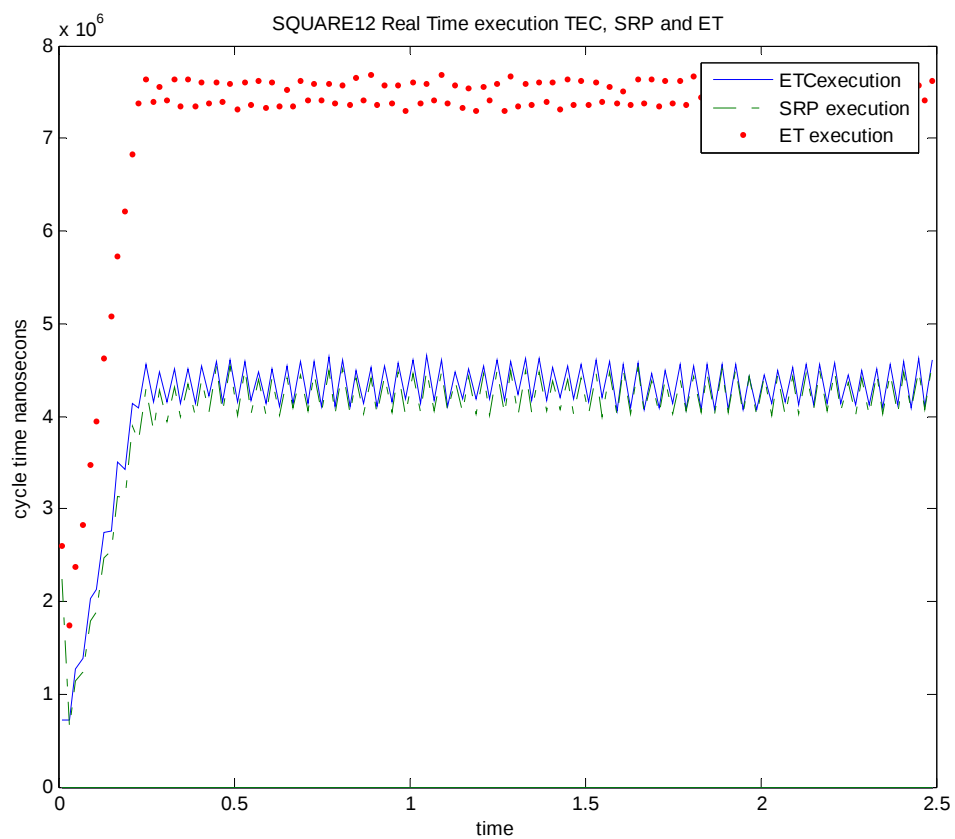


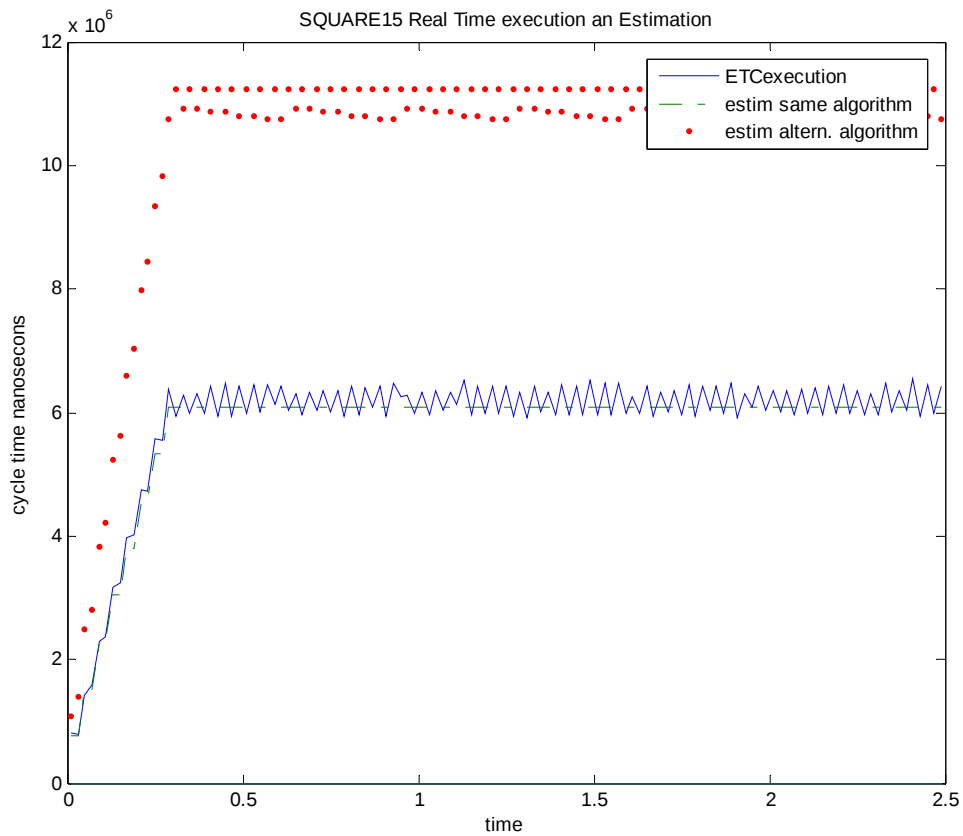
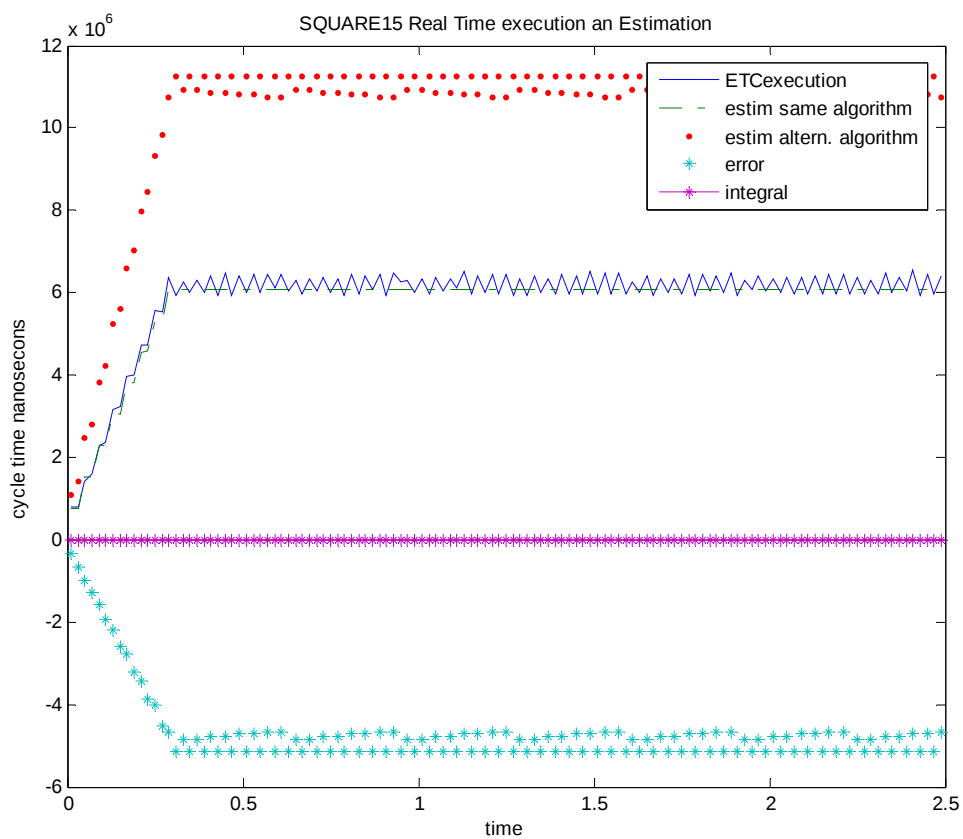


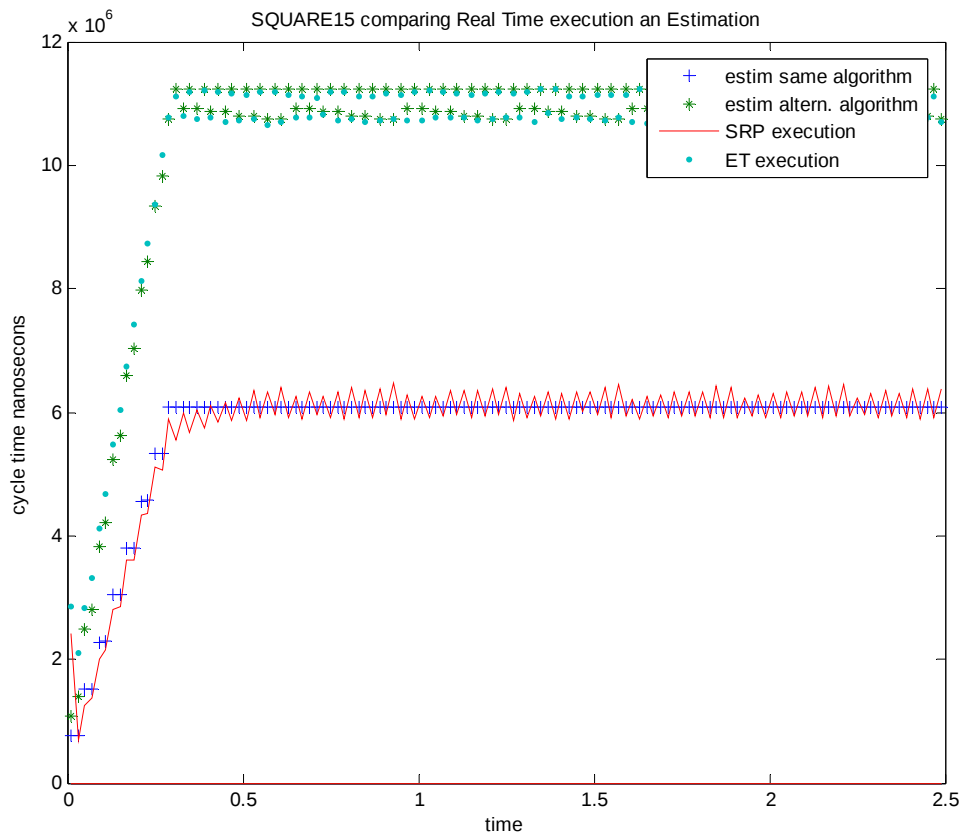
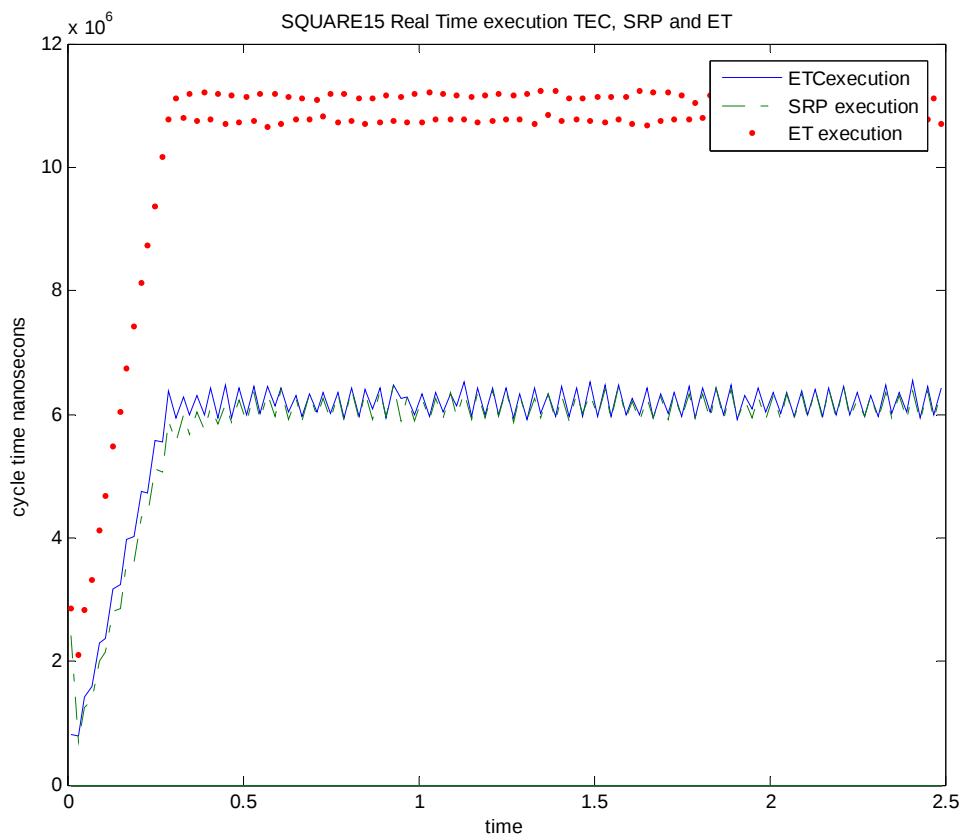




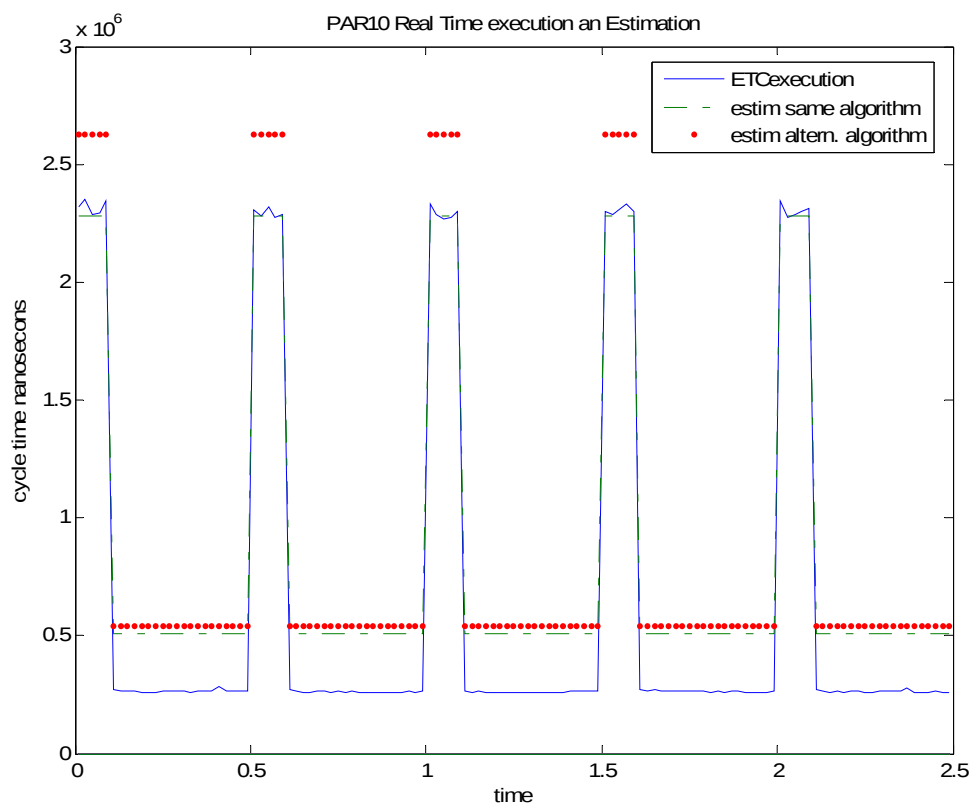
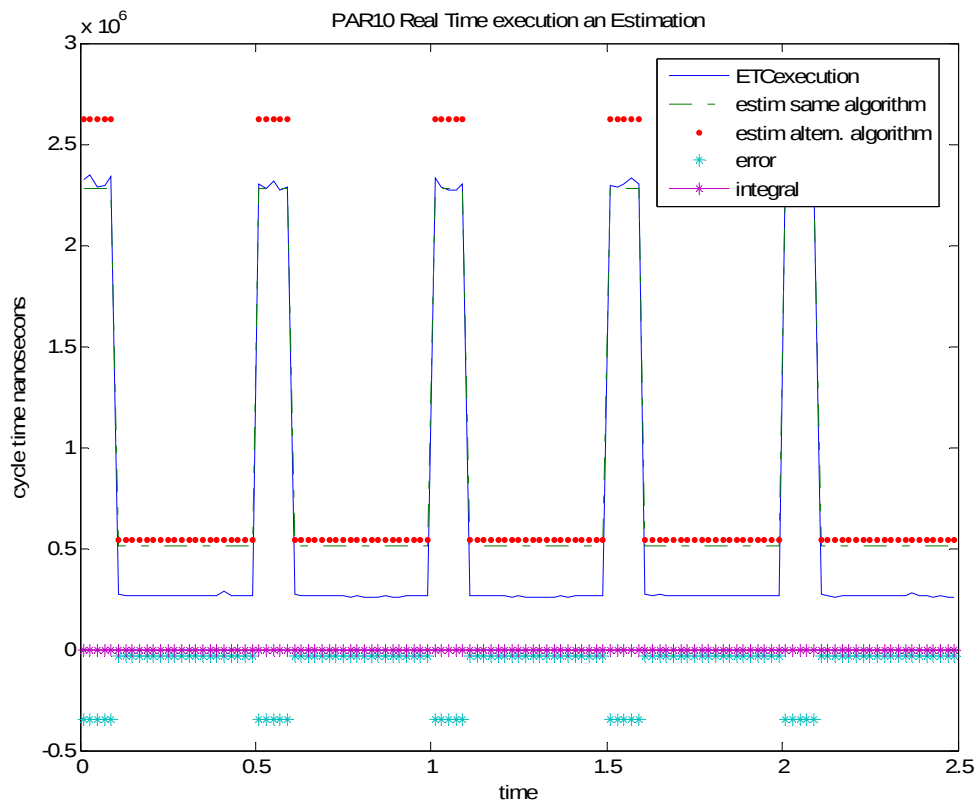


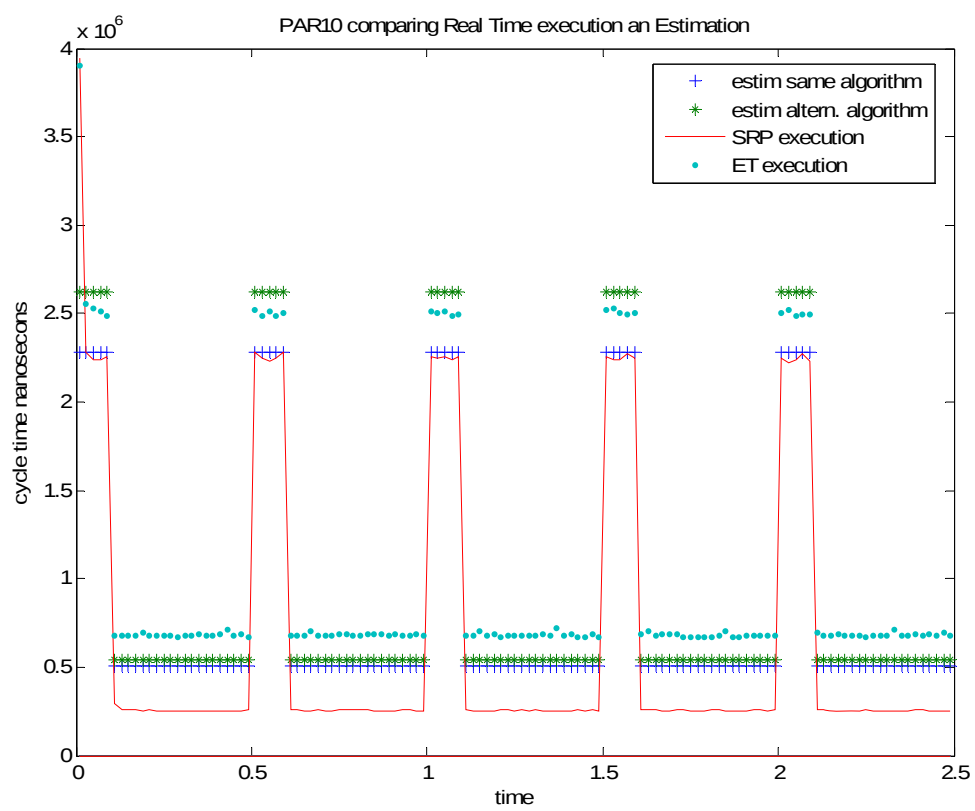
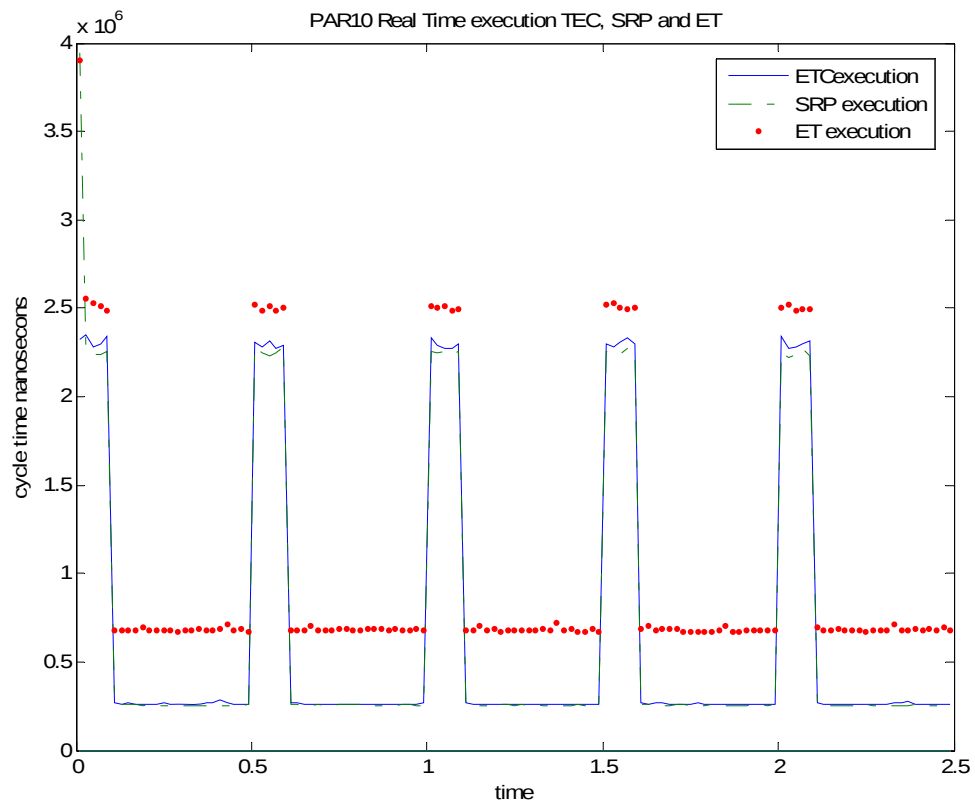


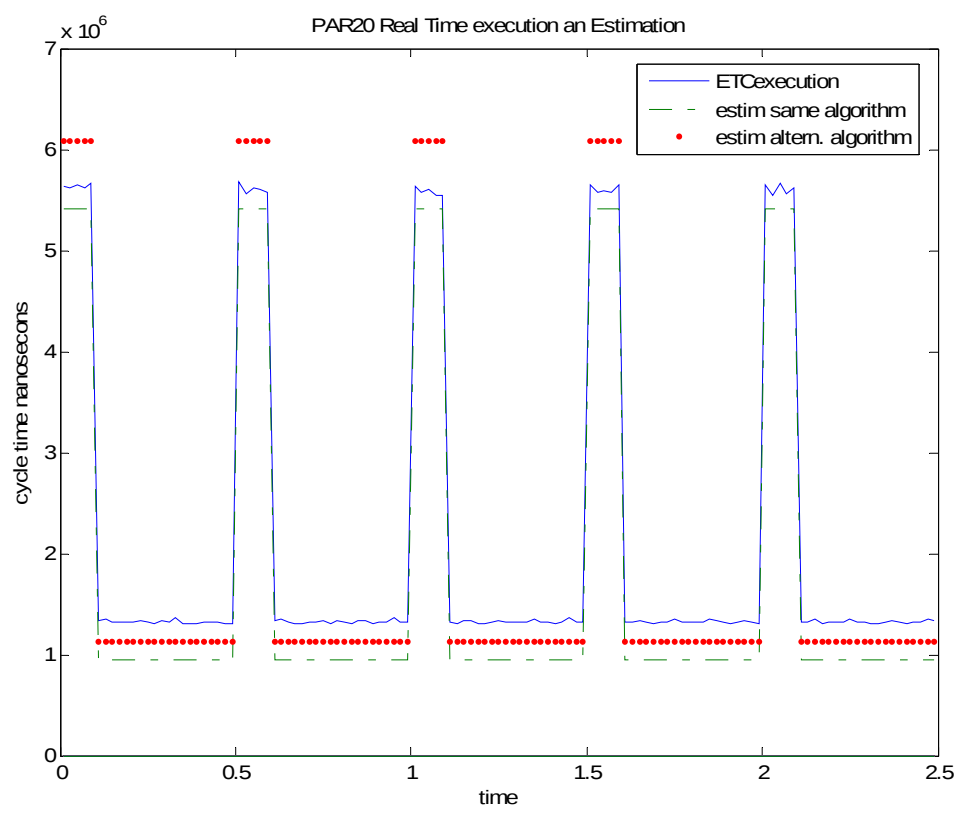
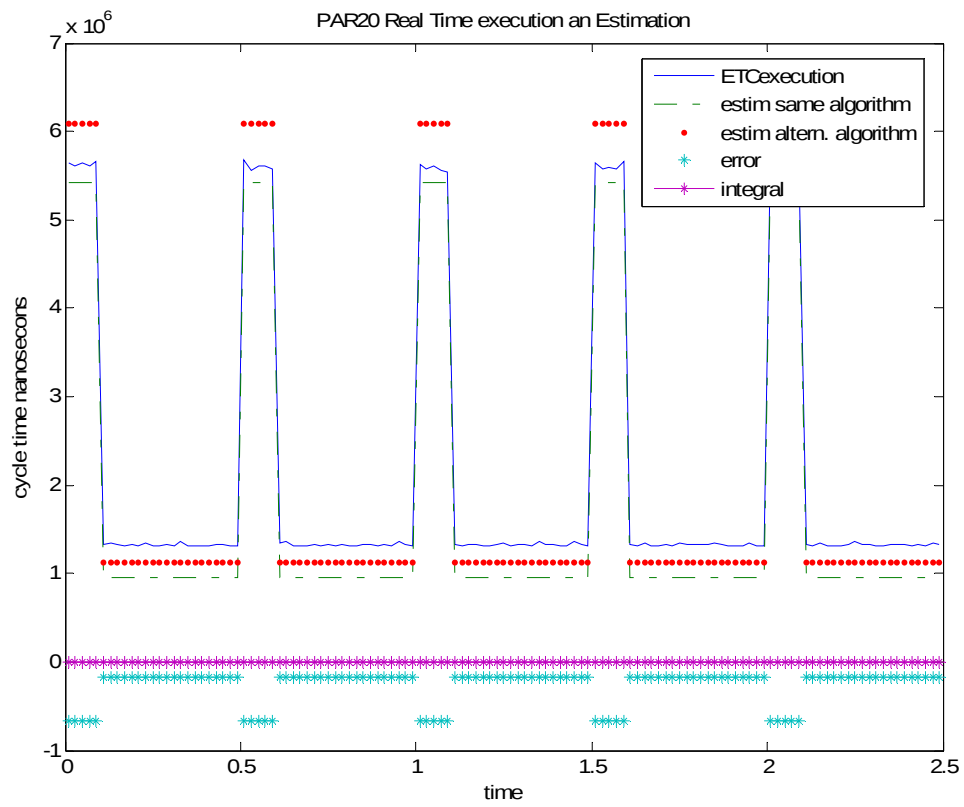


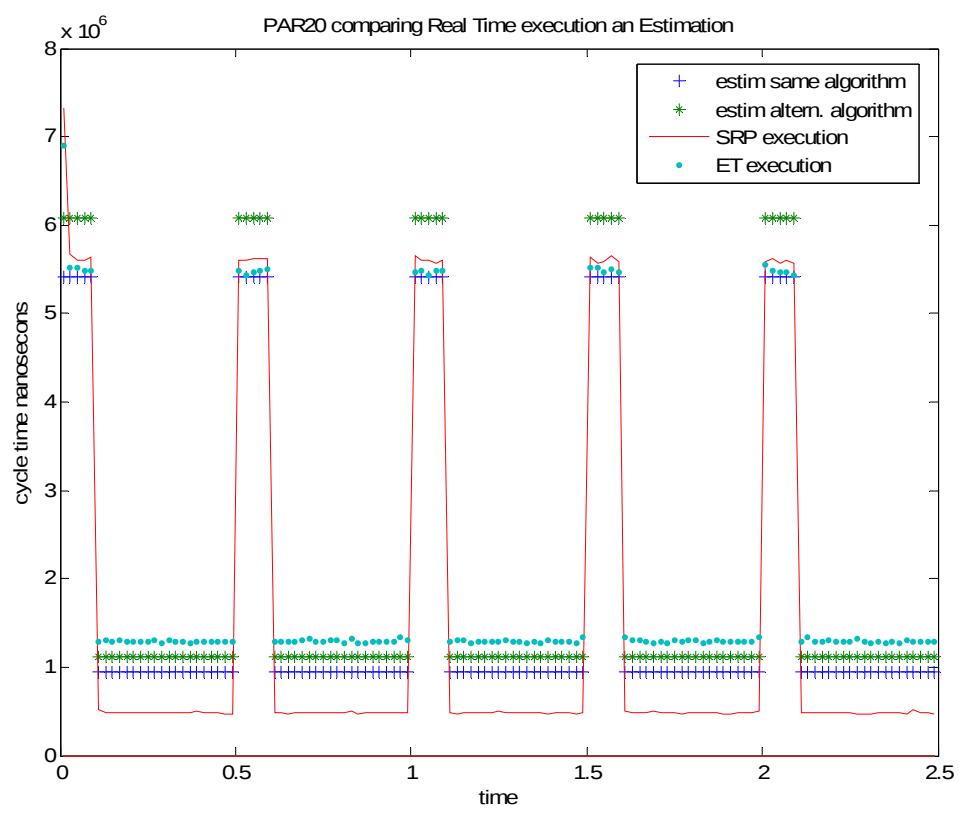
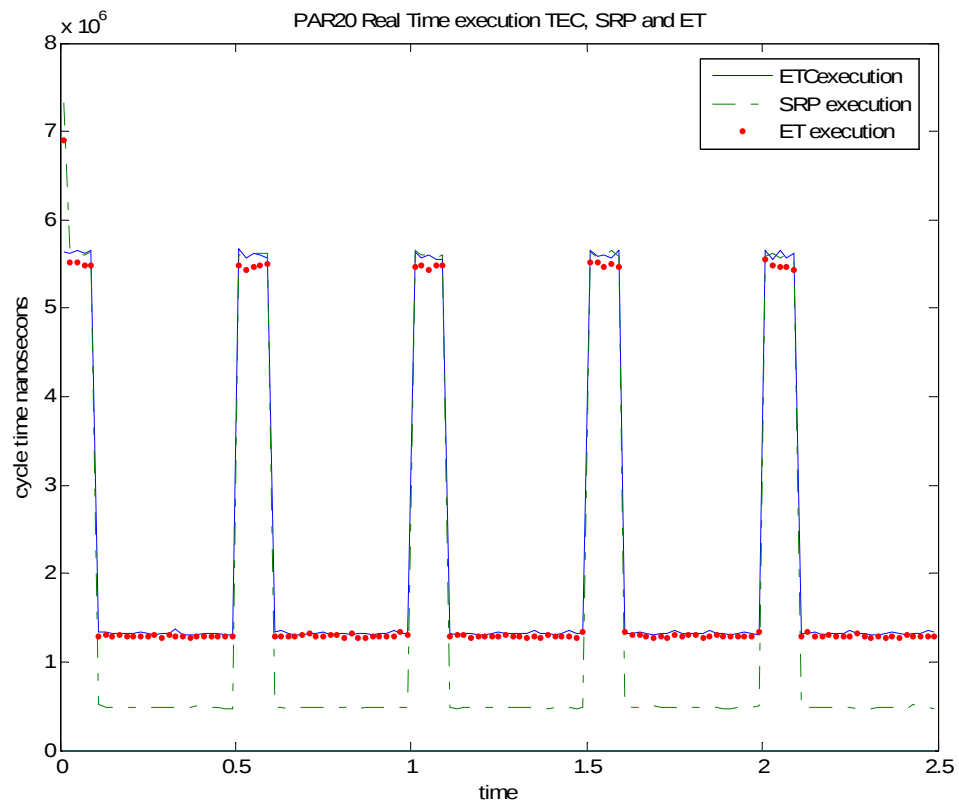


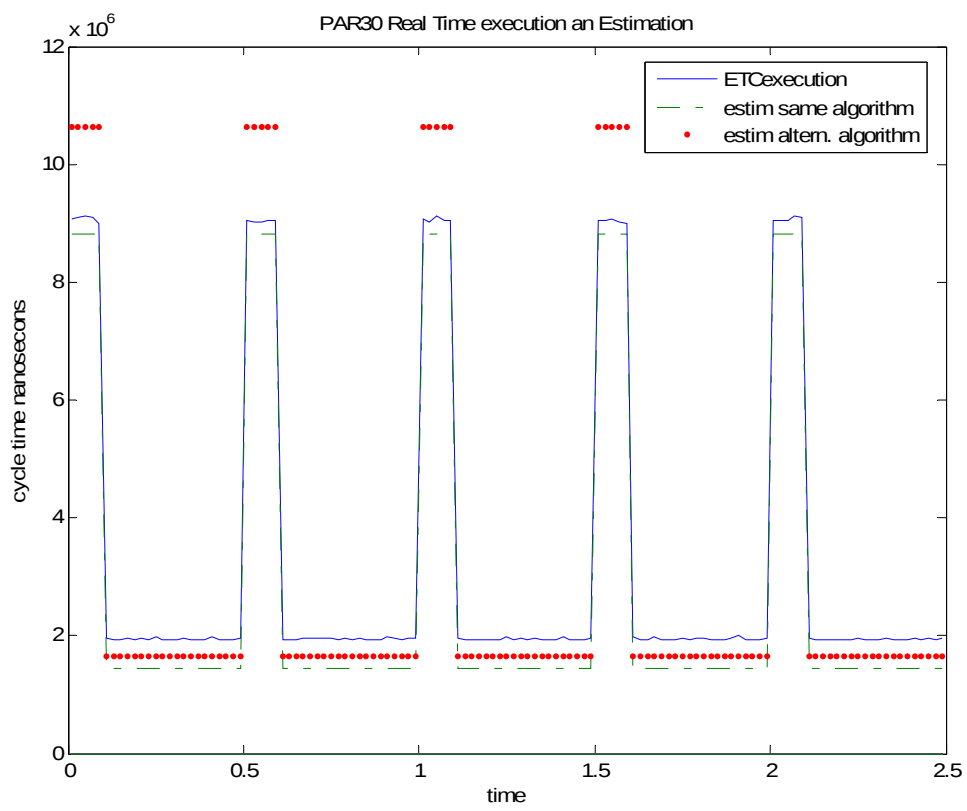
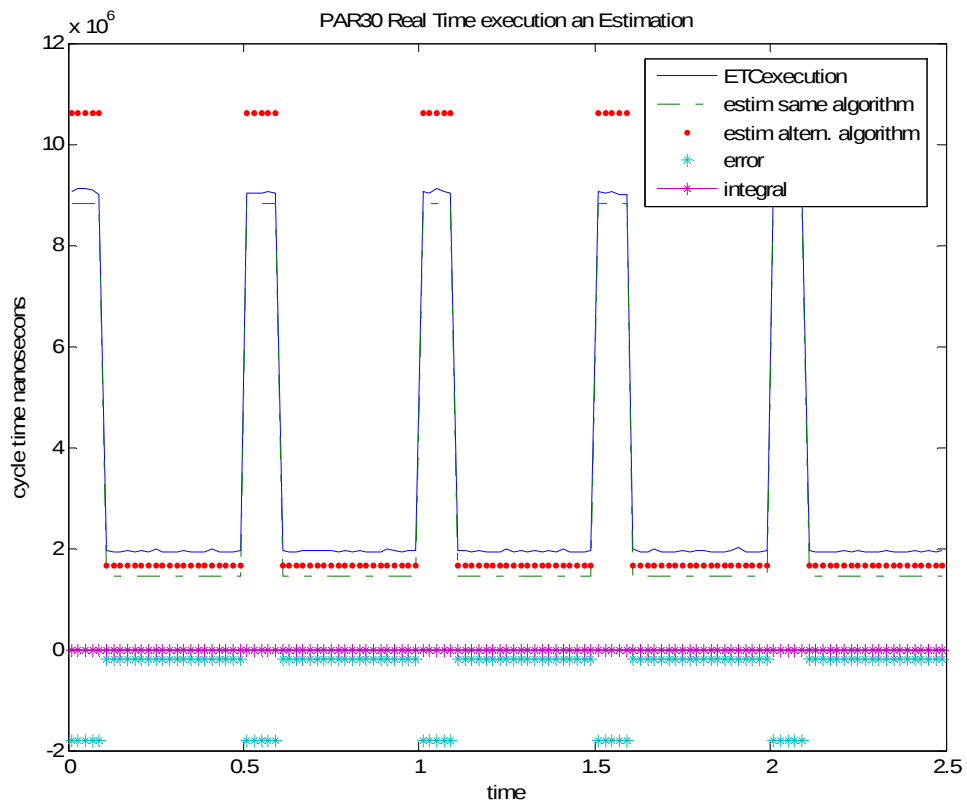
Ensayos 5 con eventos 20 sin eventos

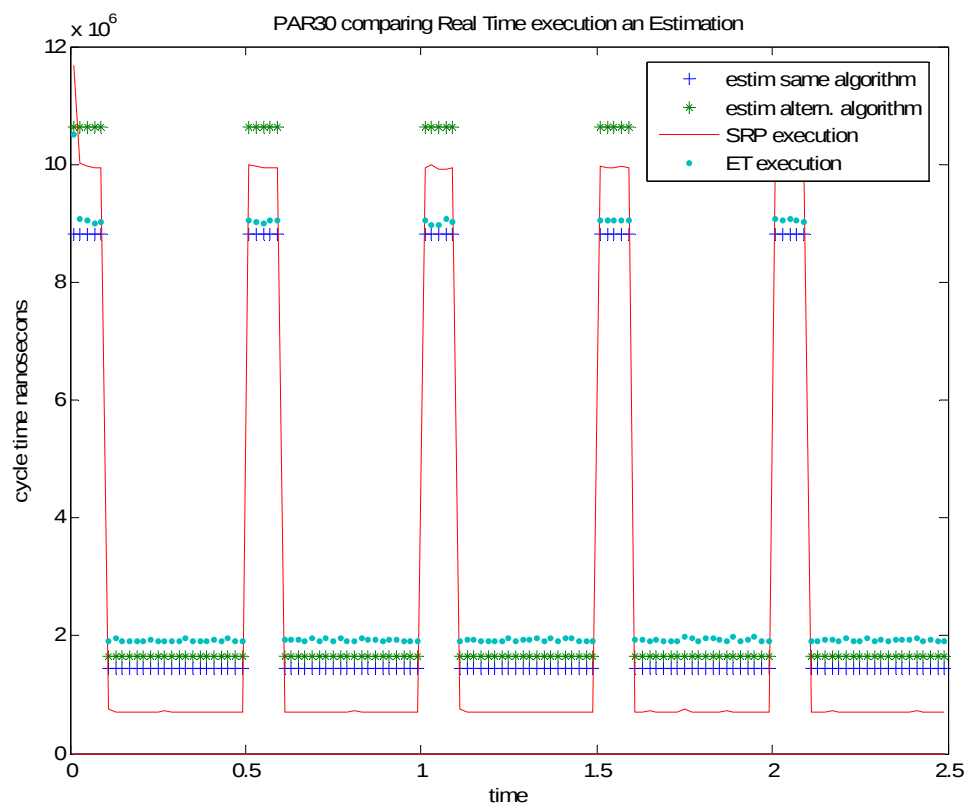
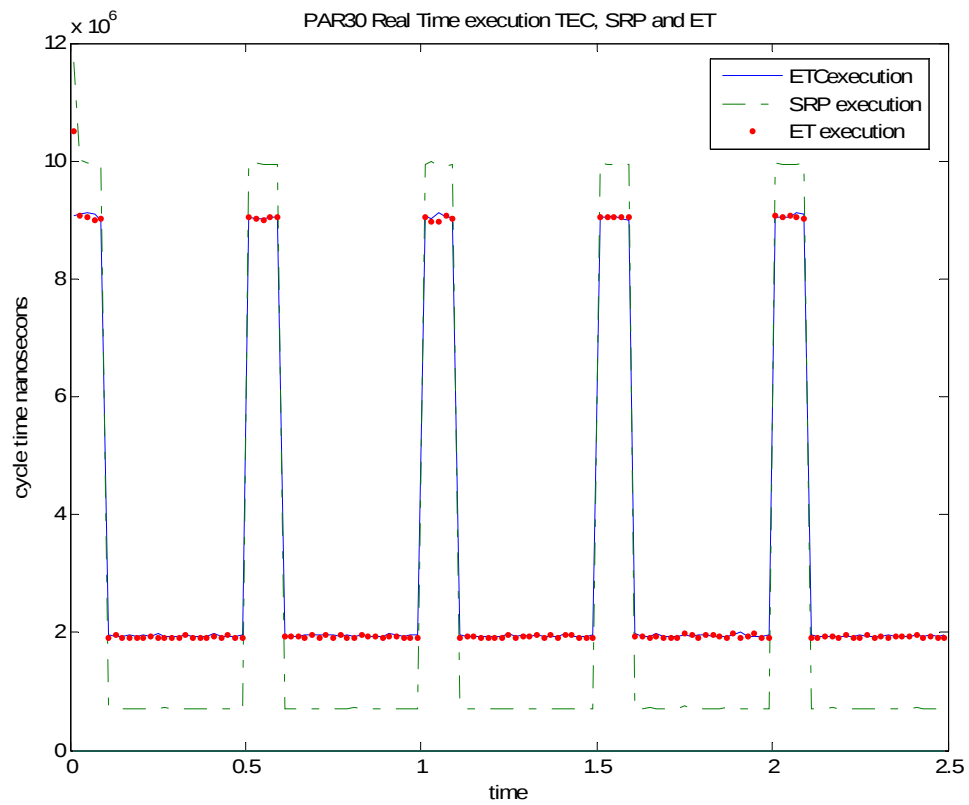


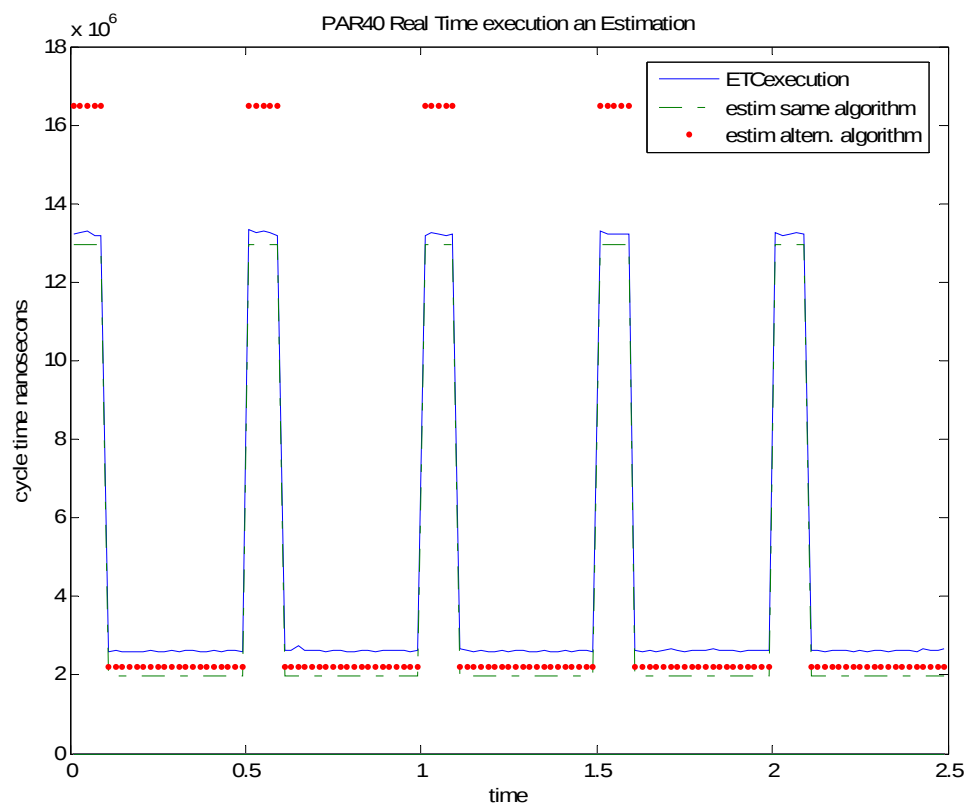
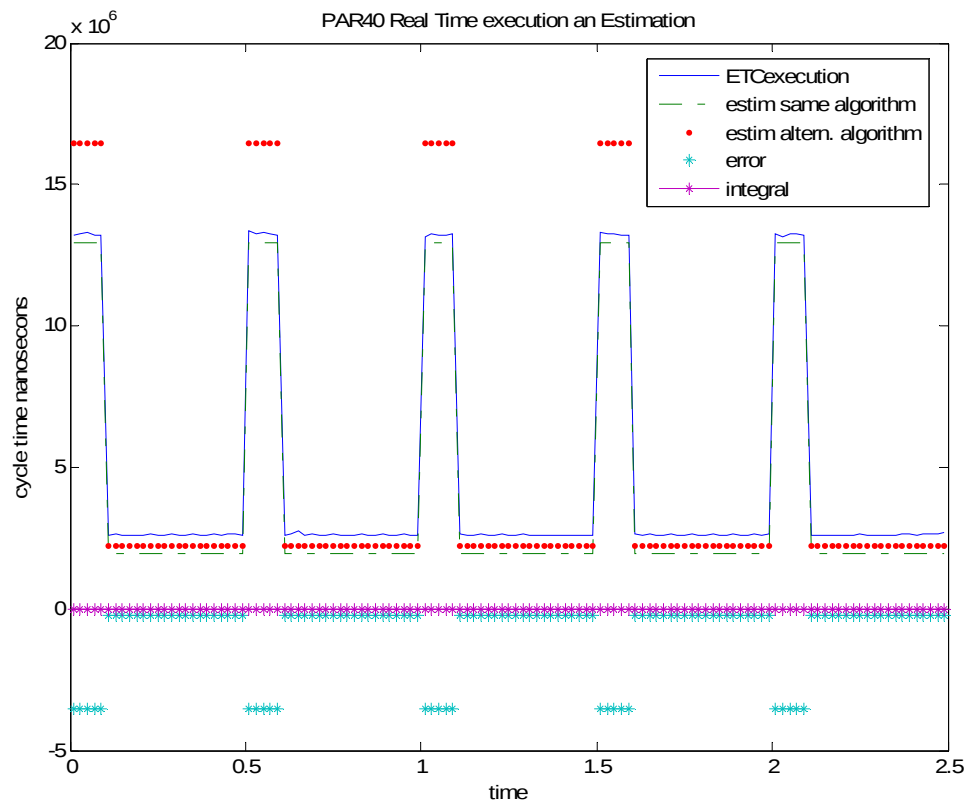


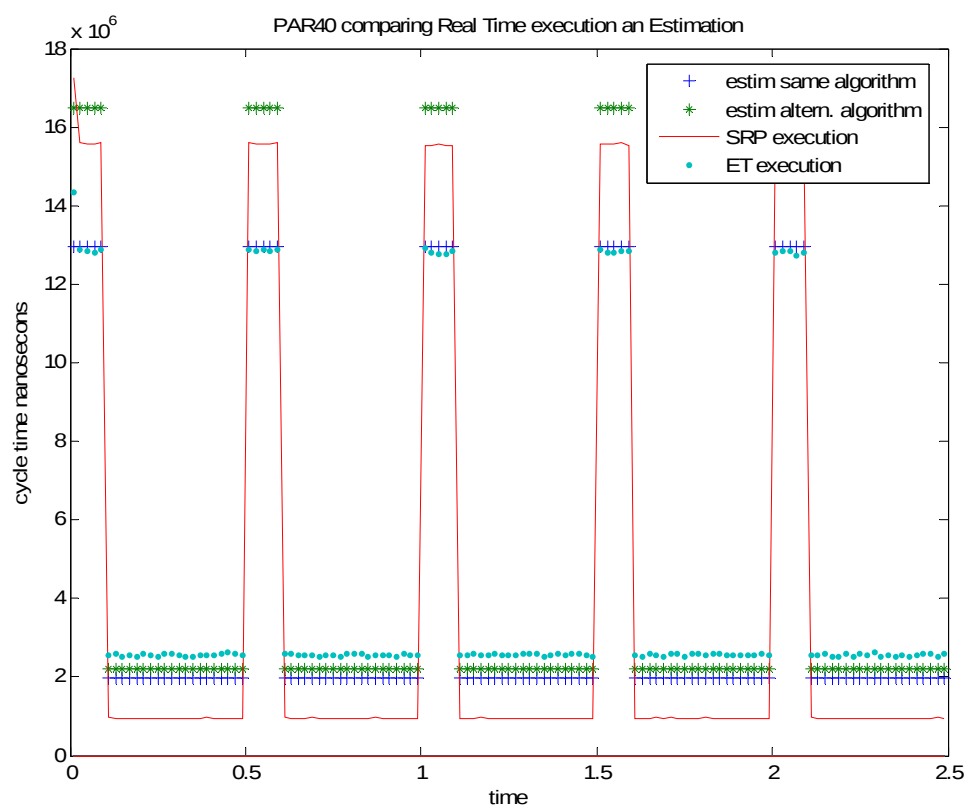
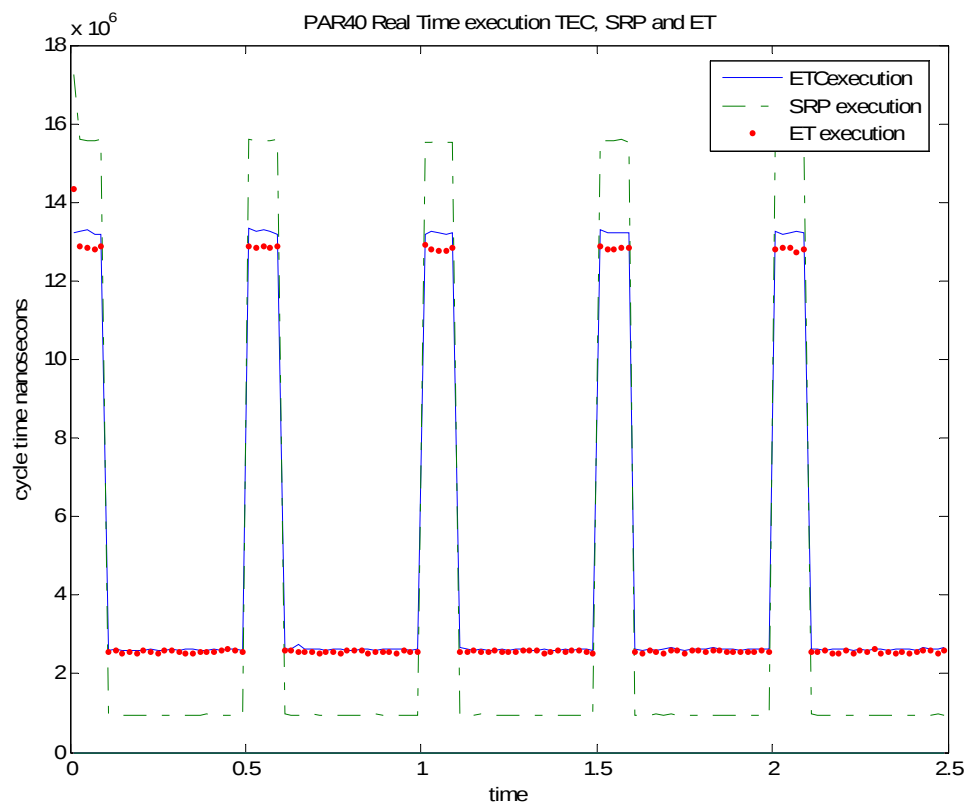


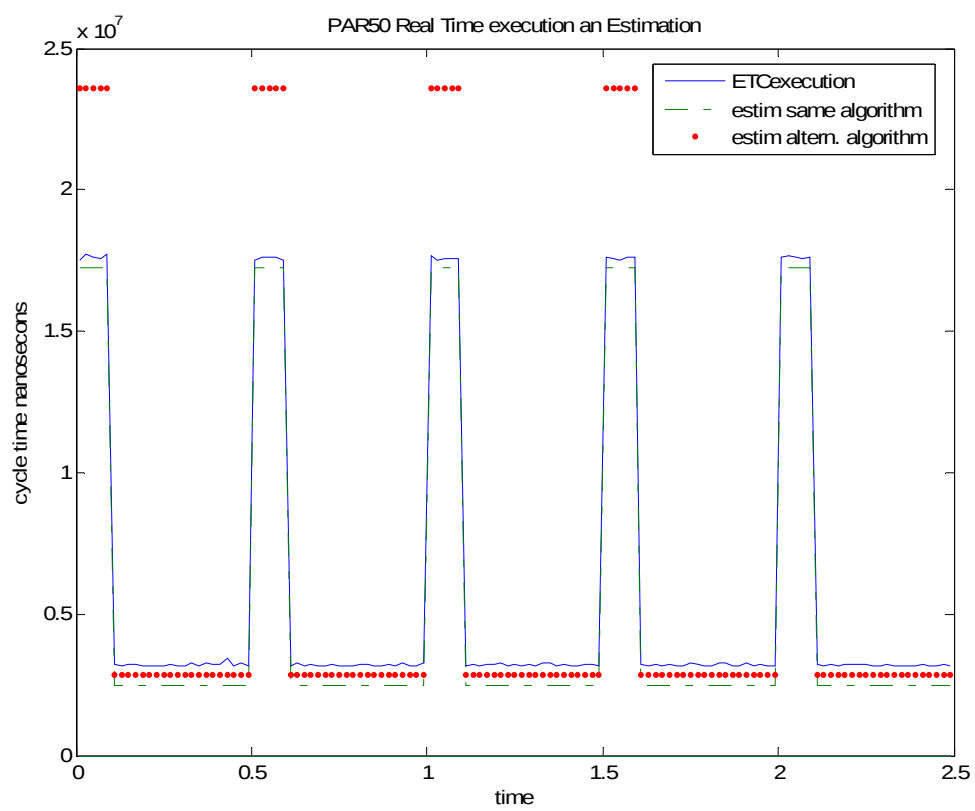
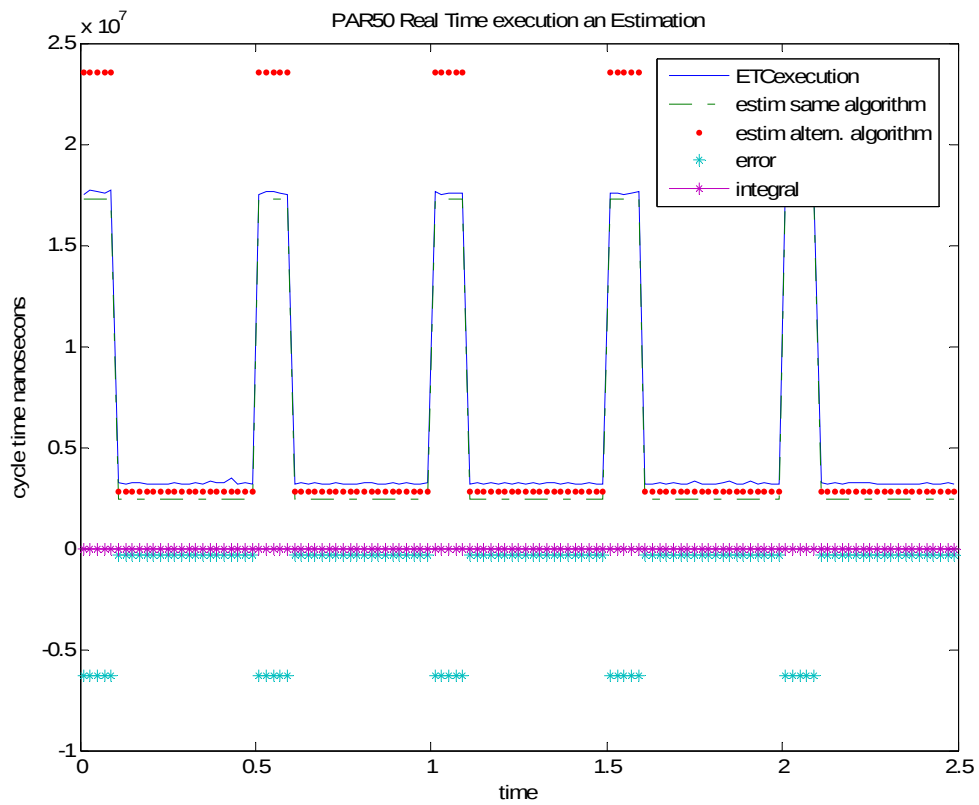


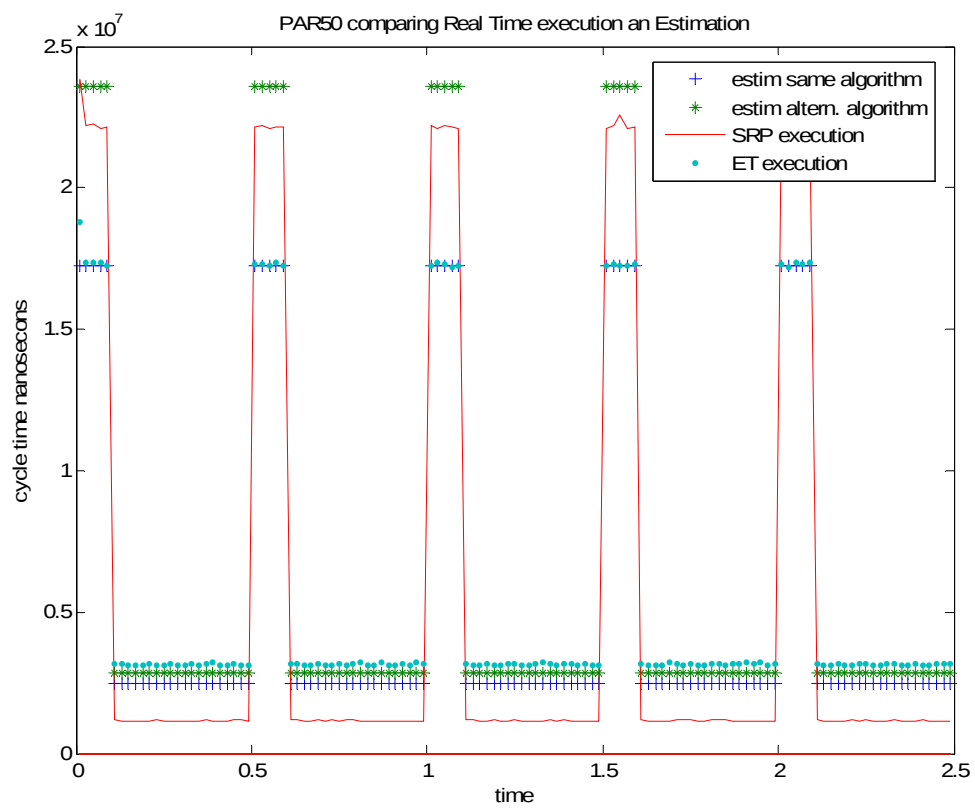
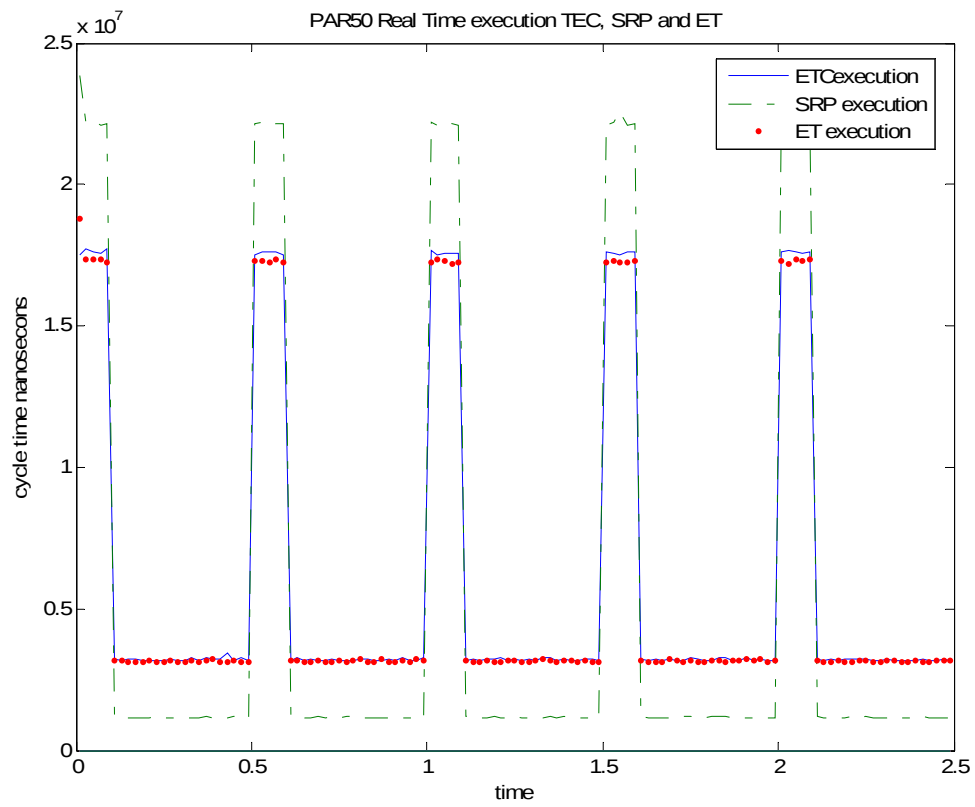


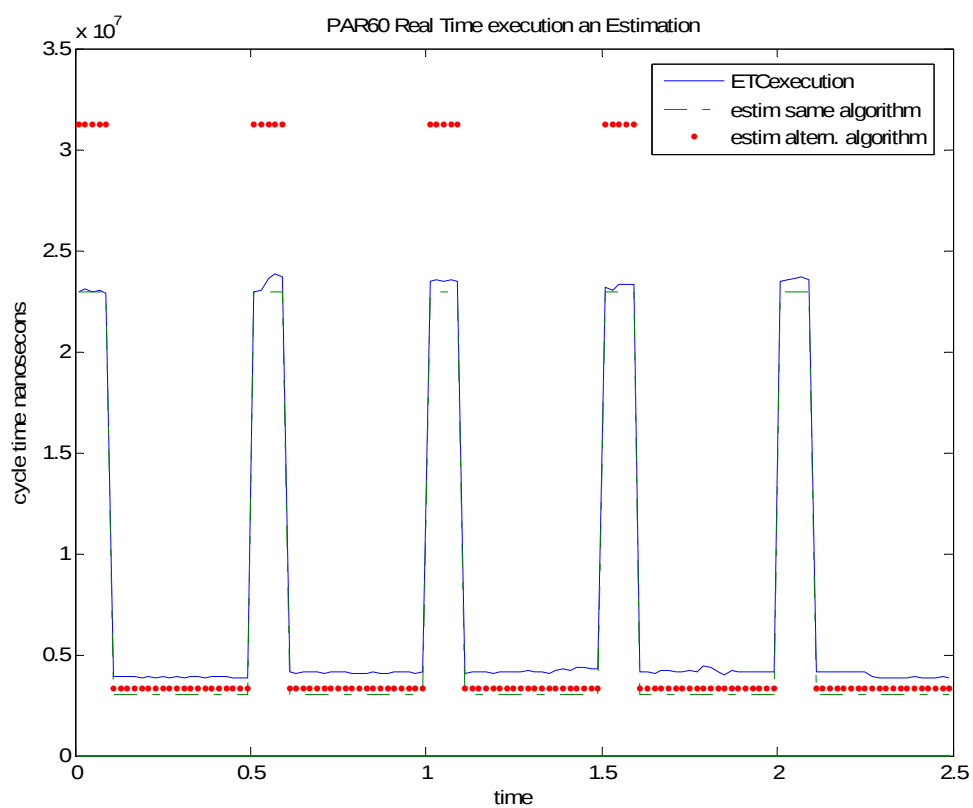
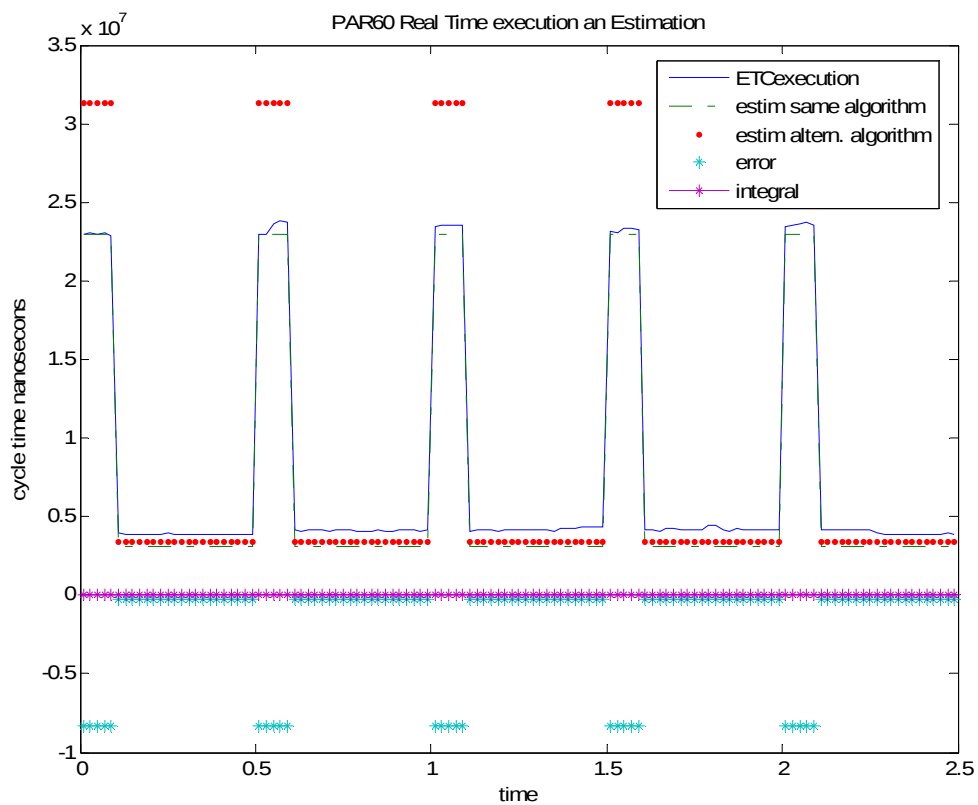


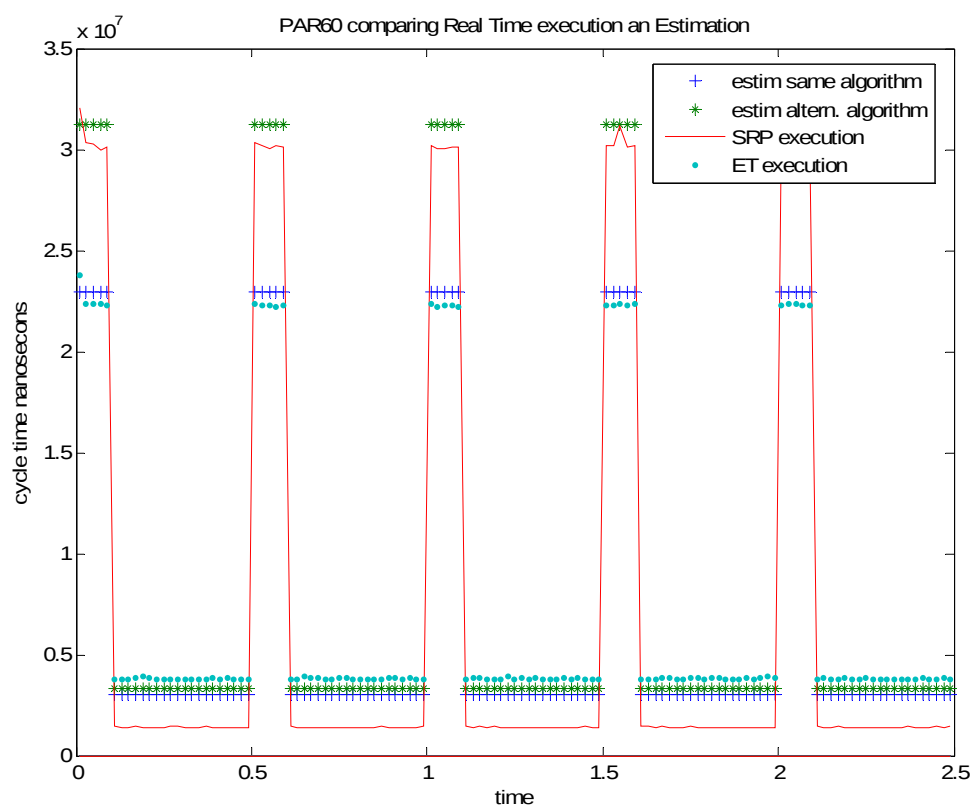
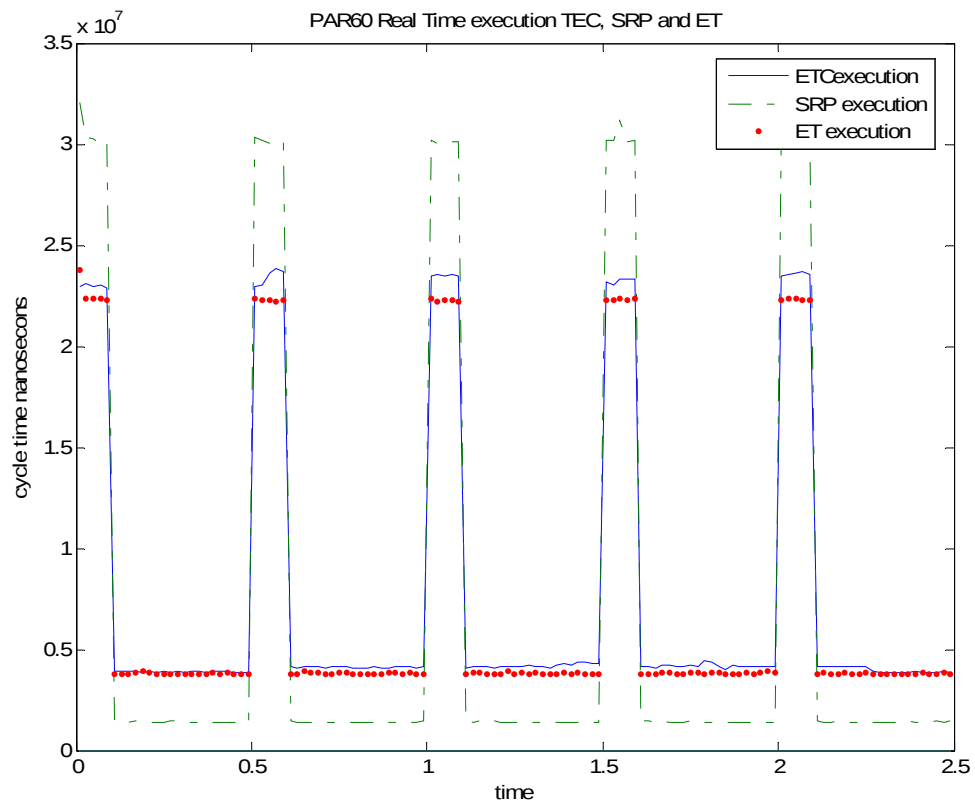


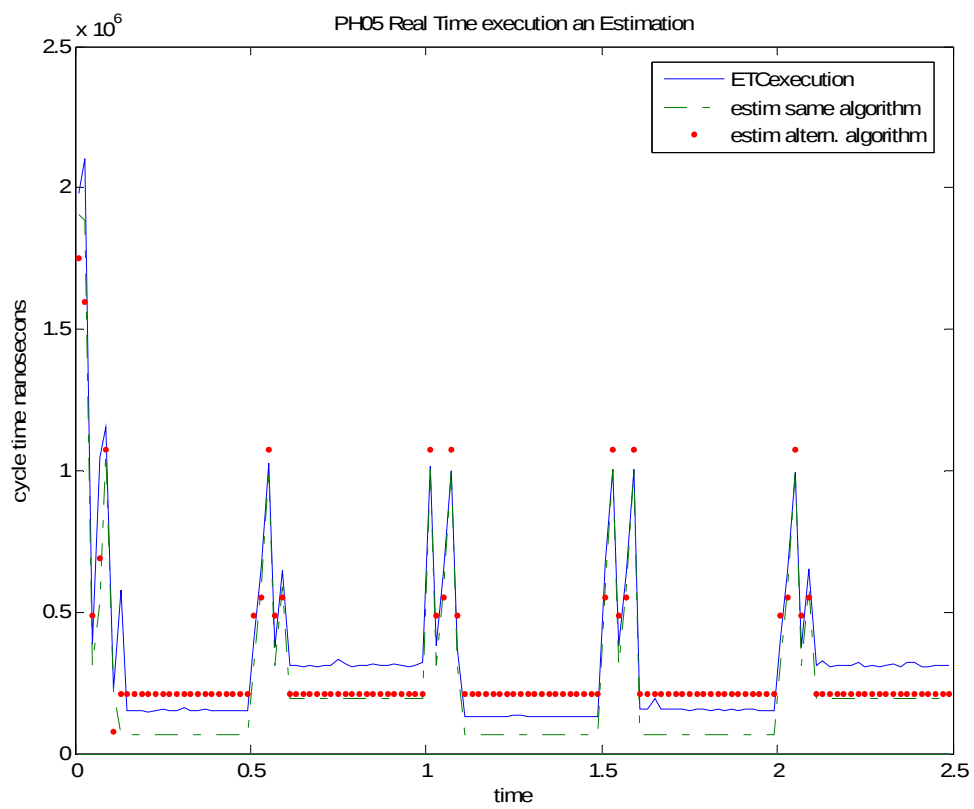
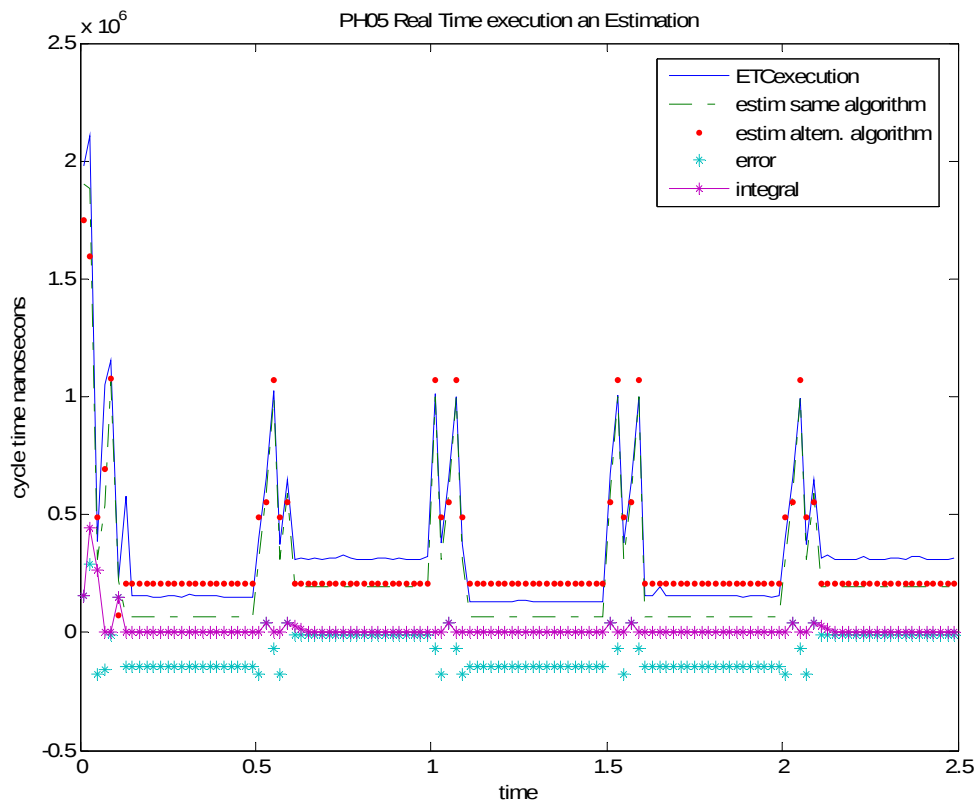


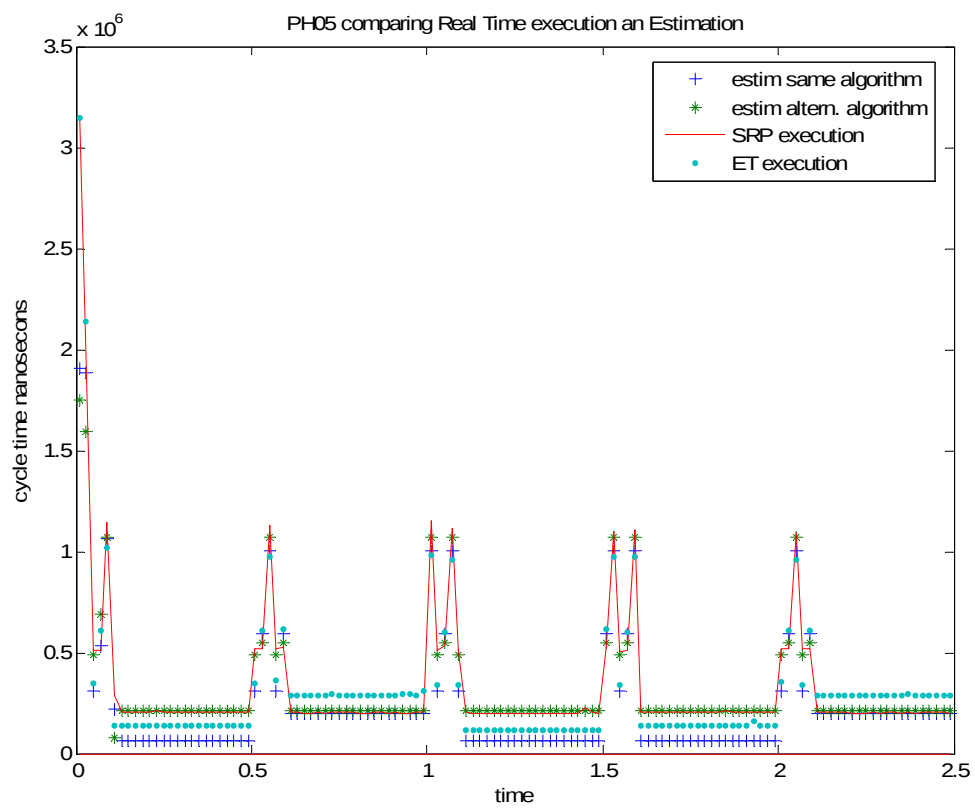
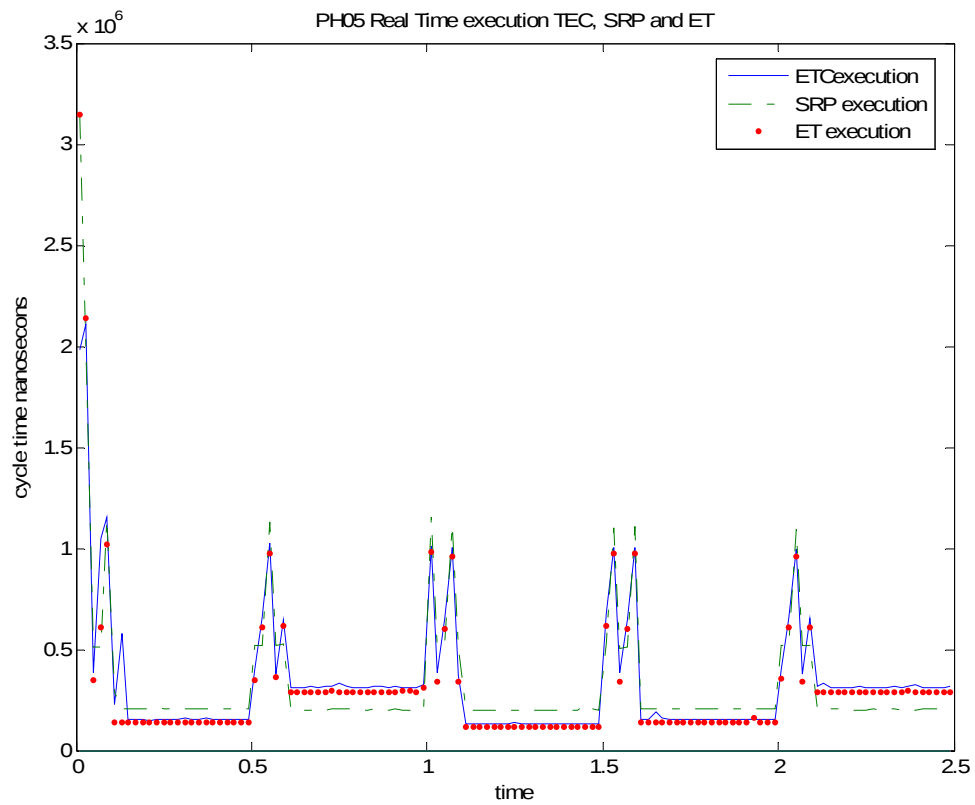


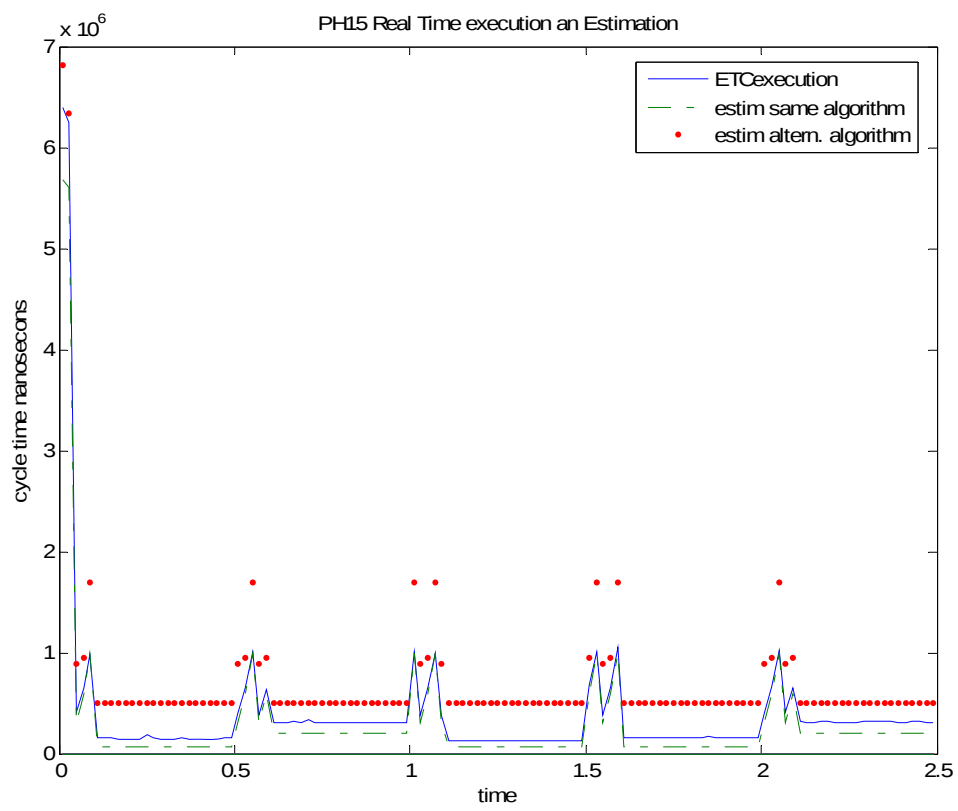
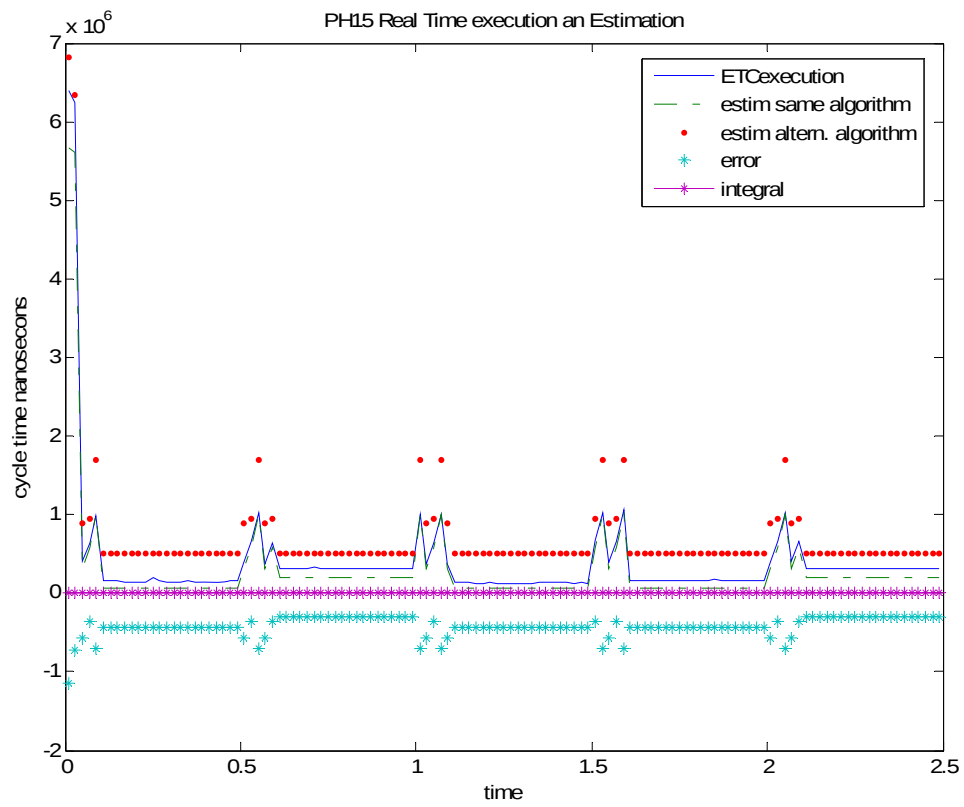


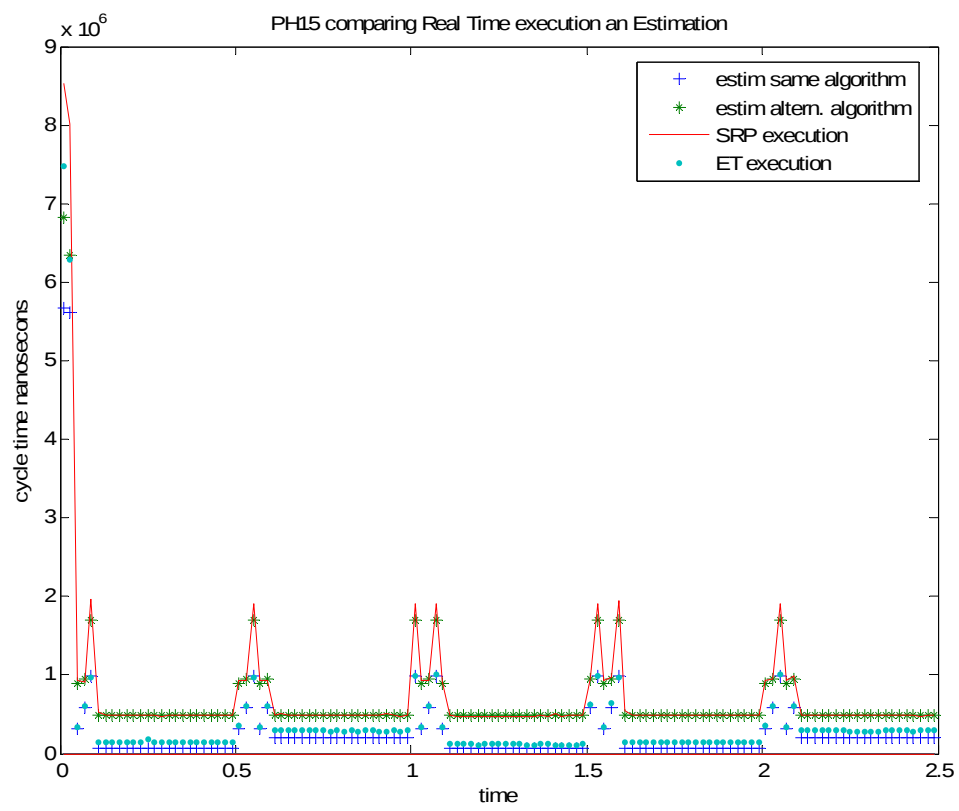
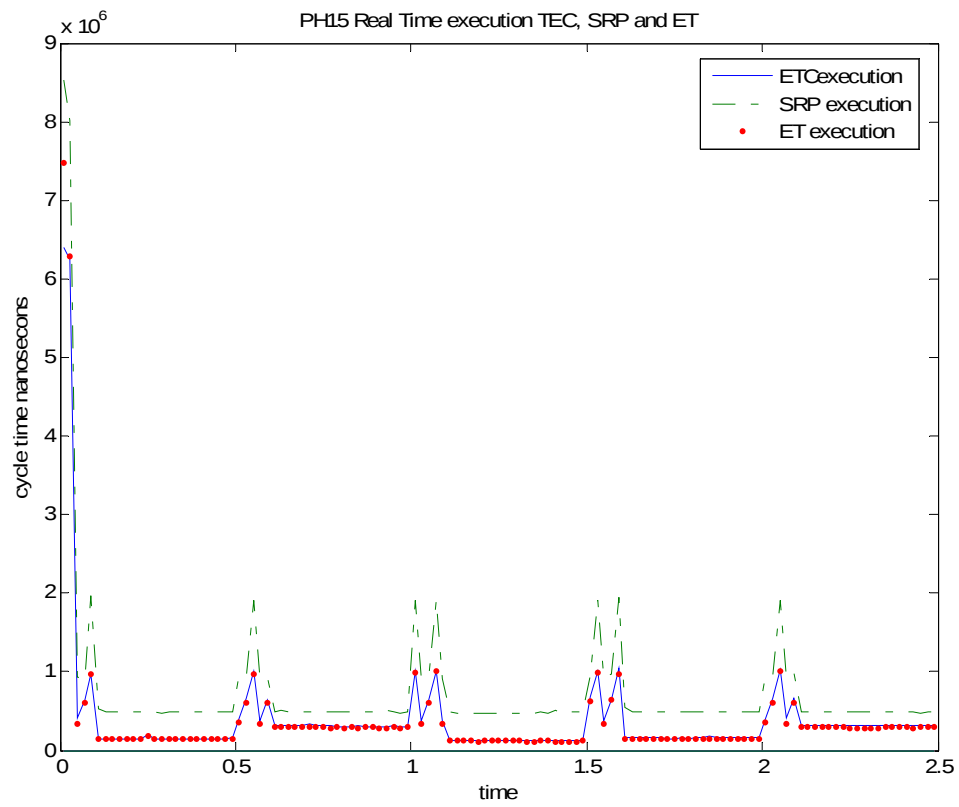


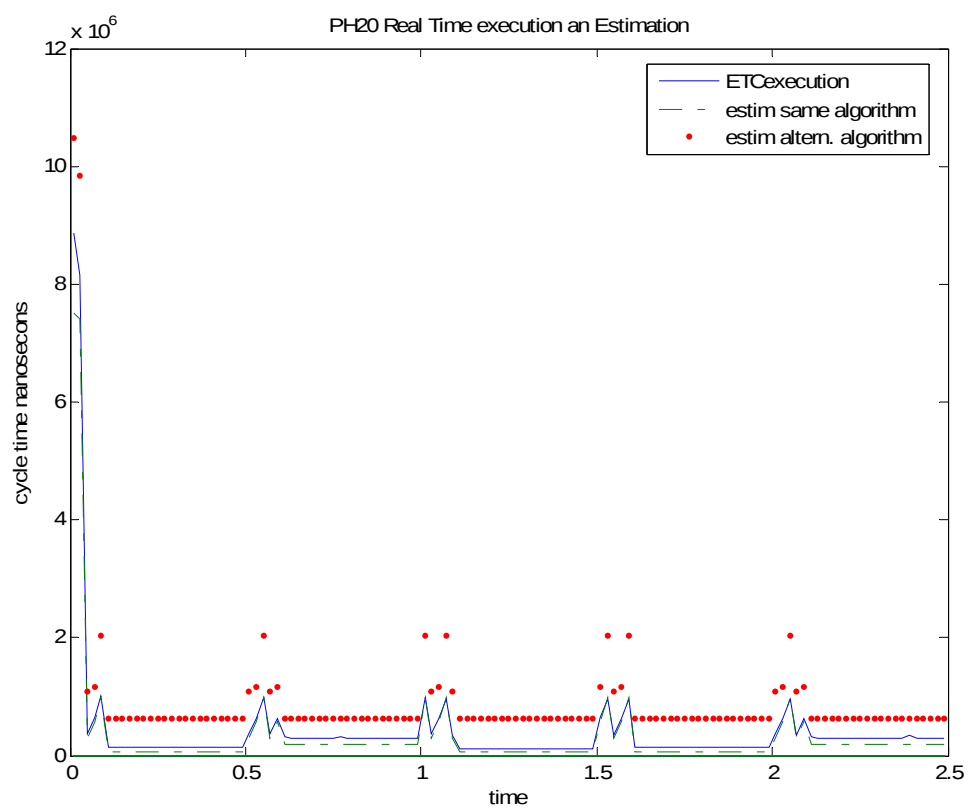
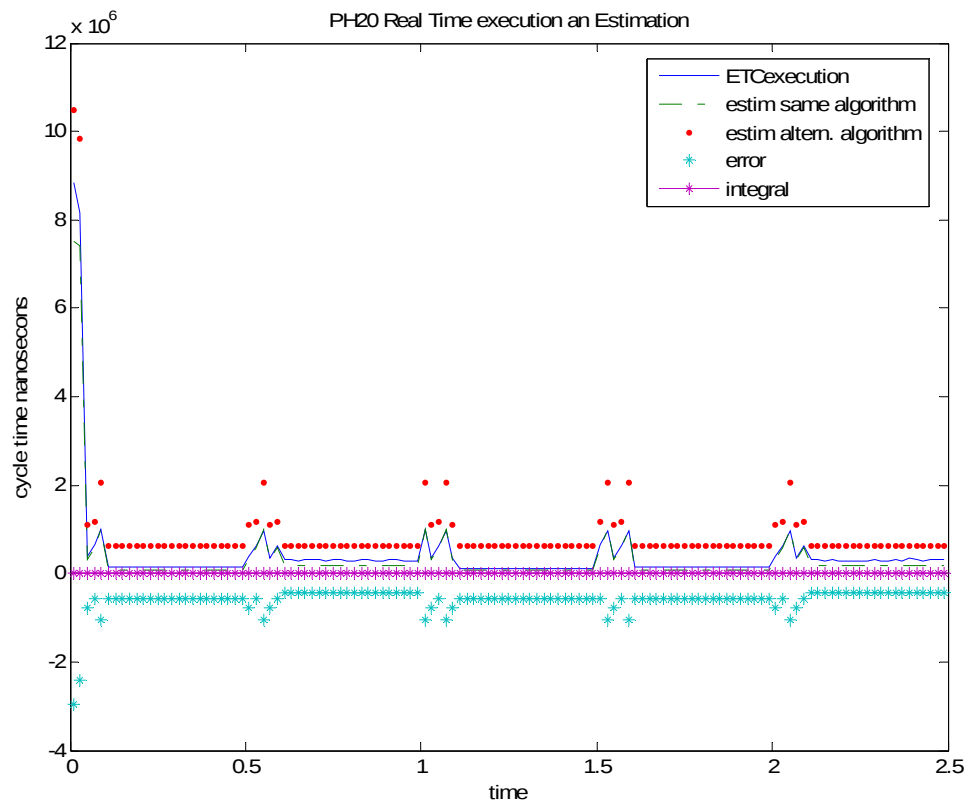


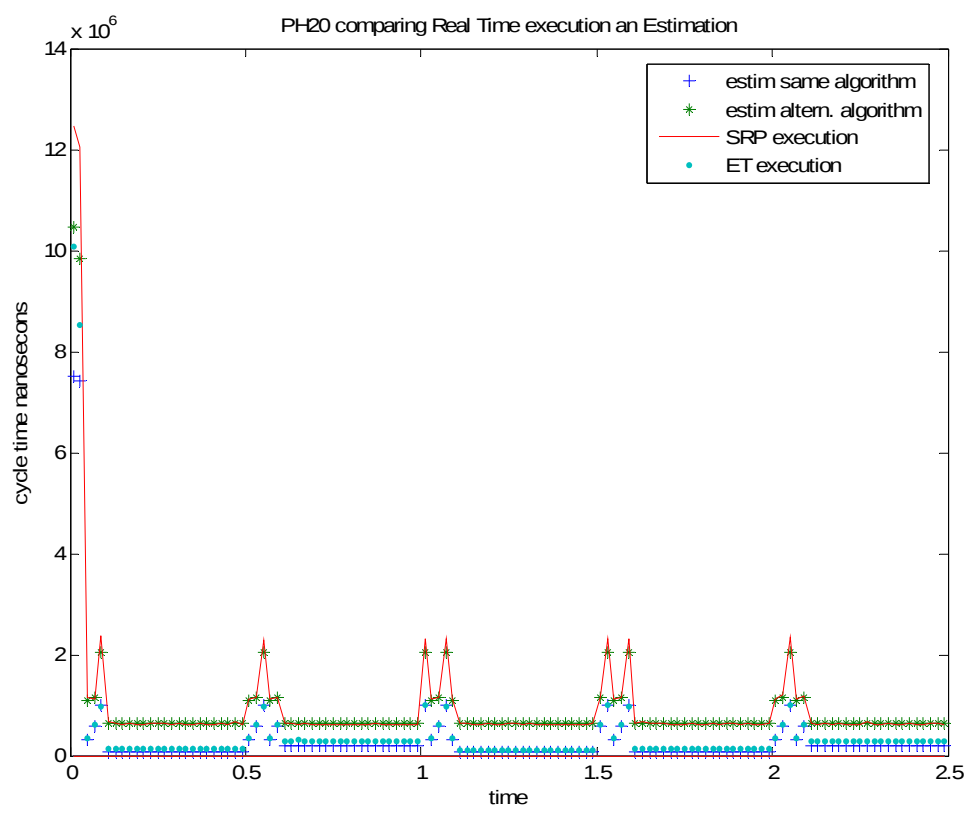
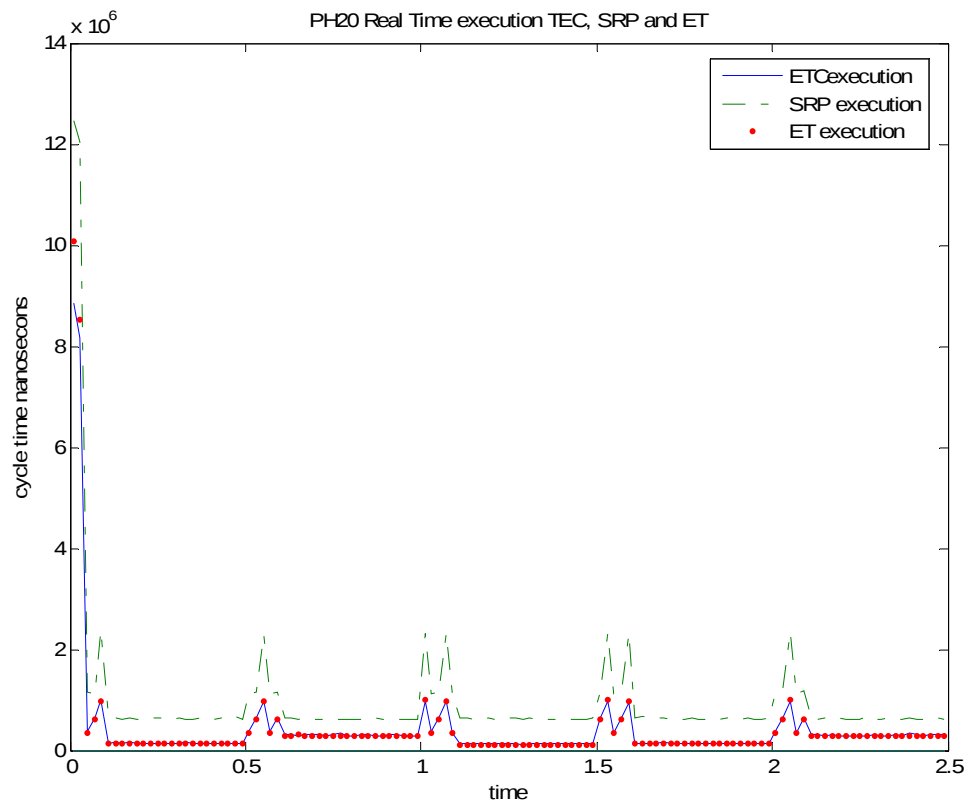


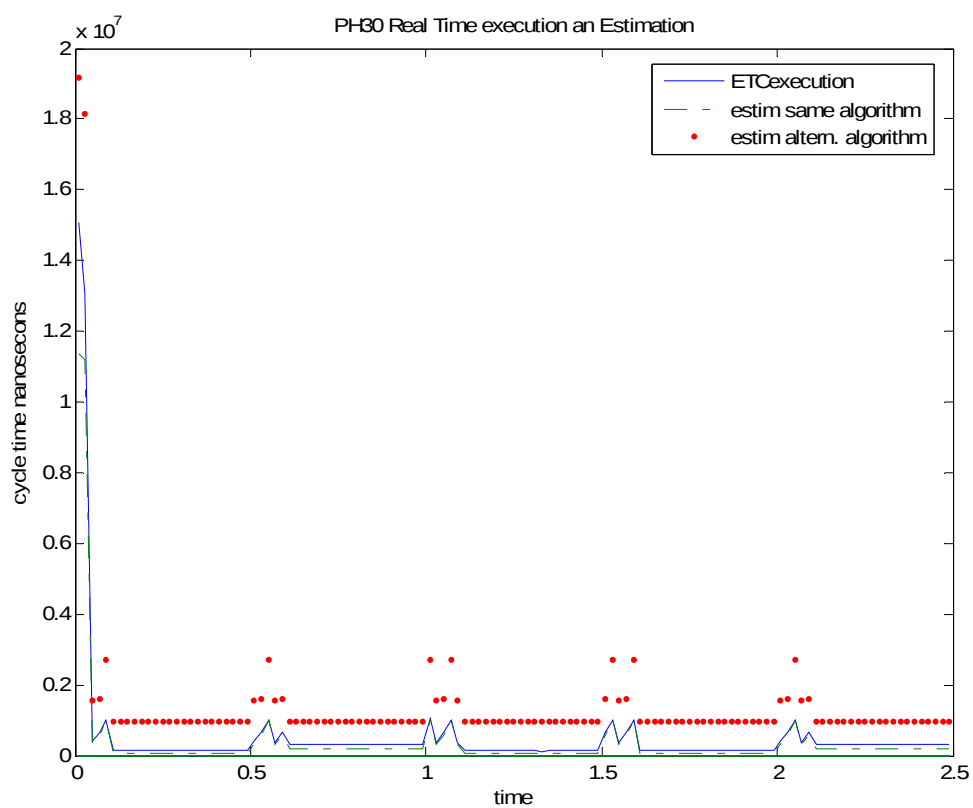
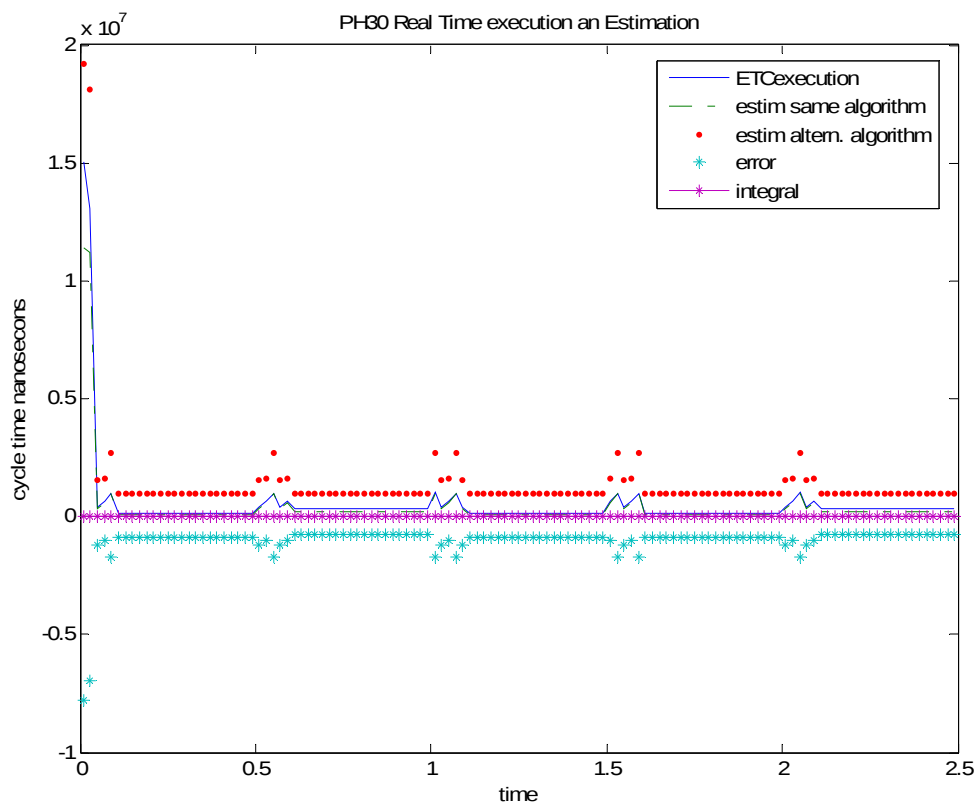


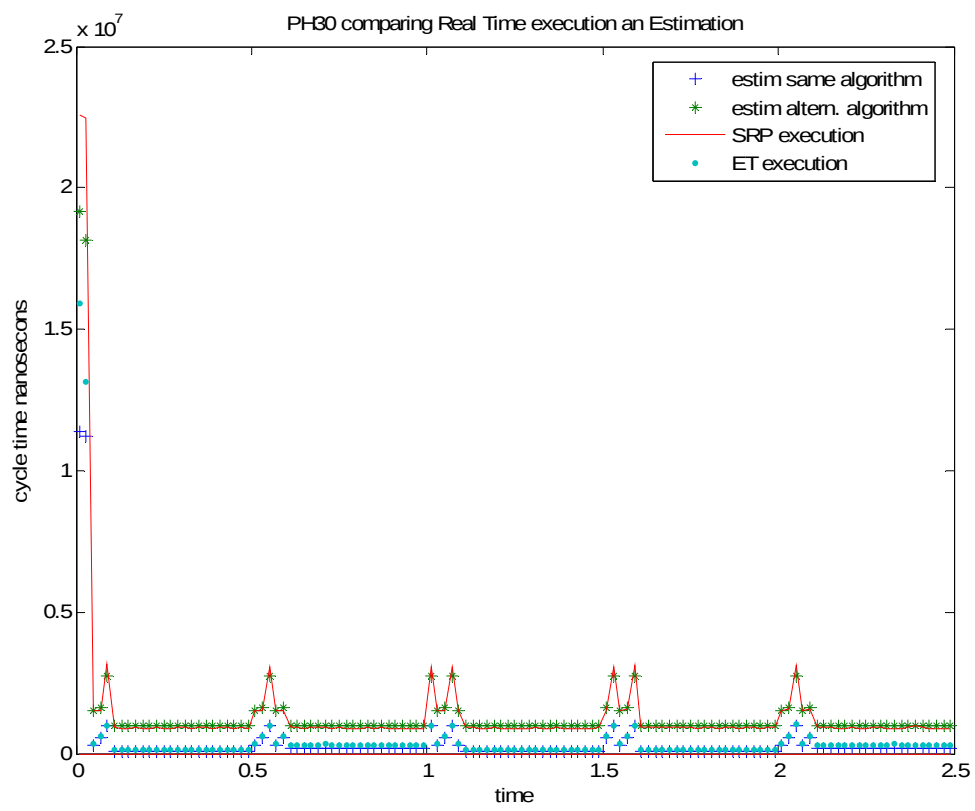
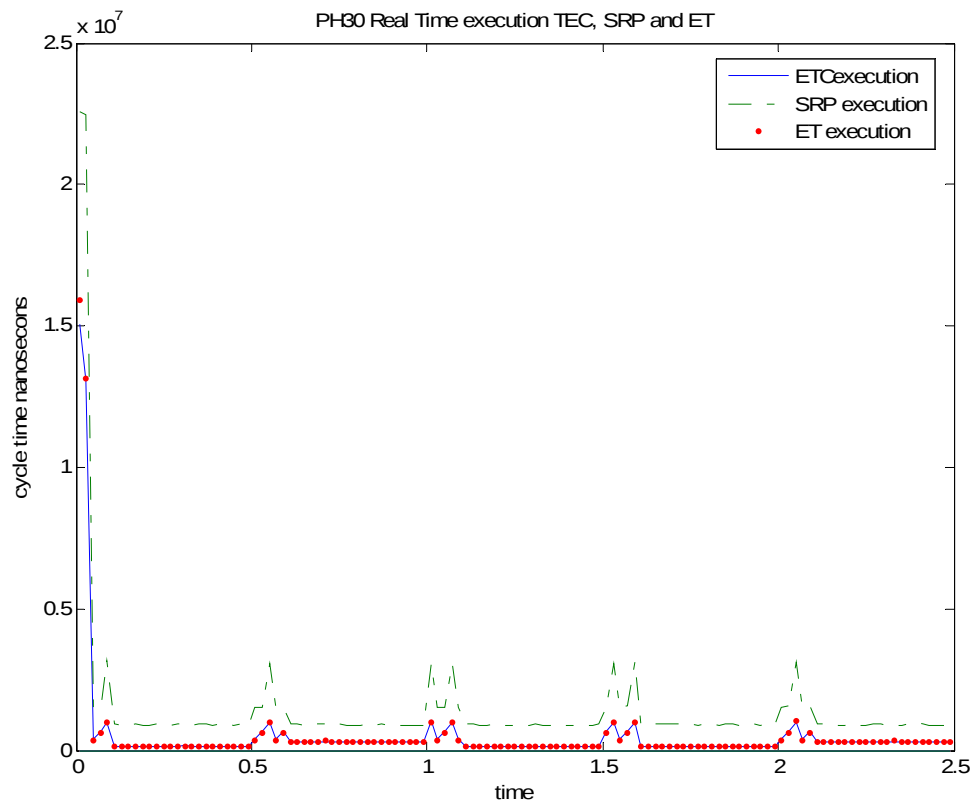


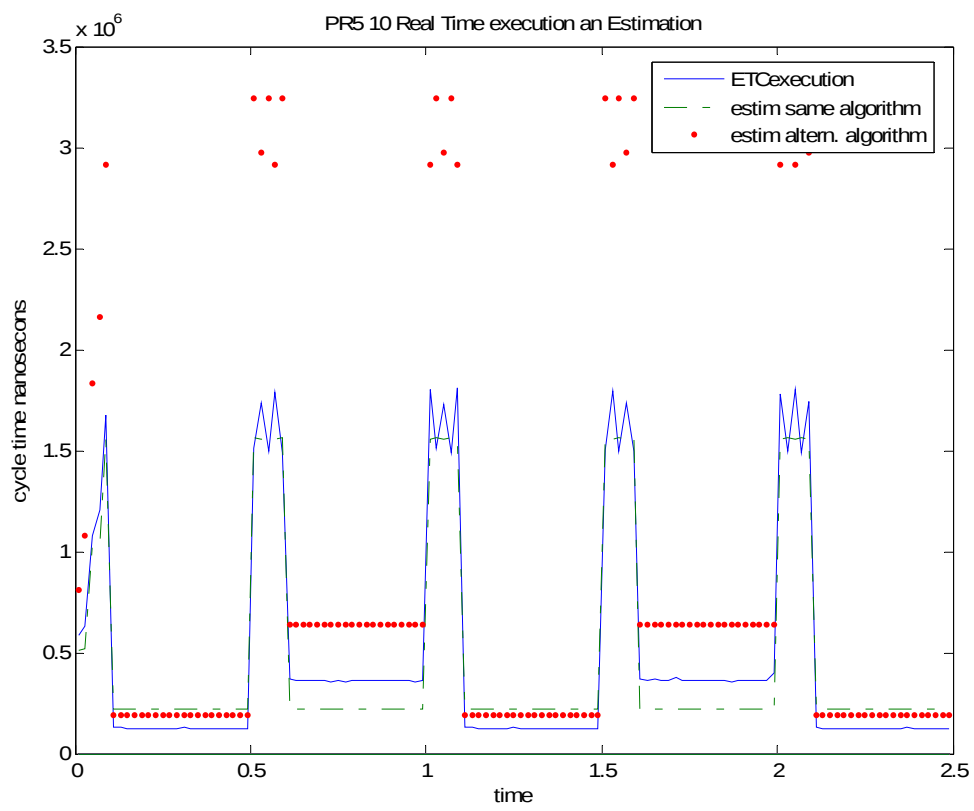
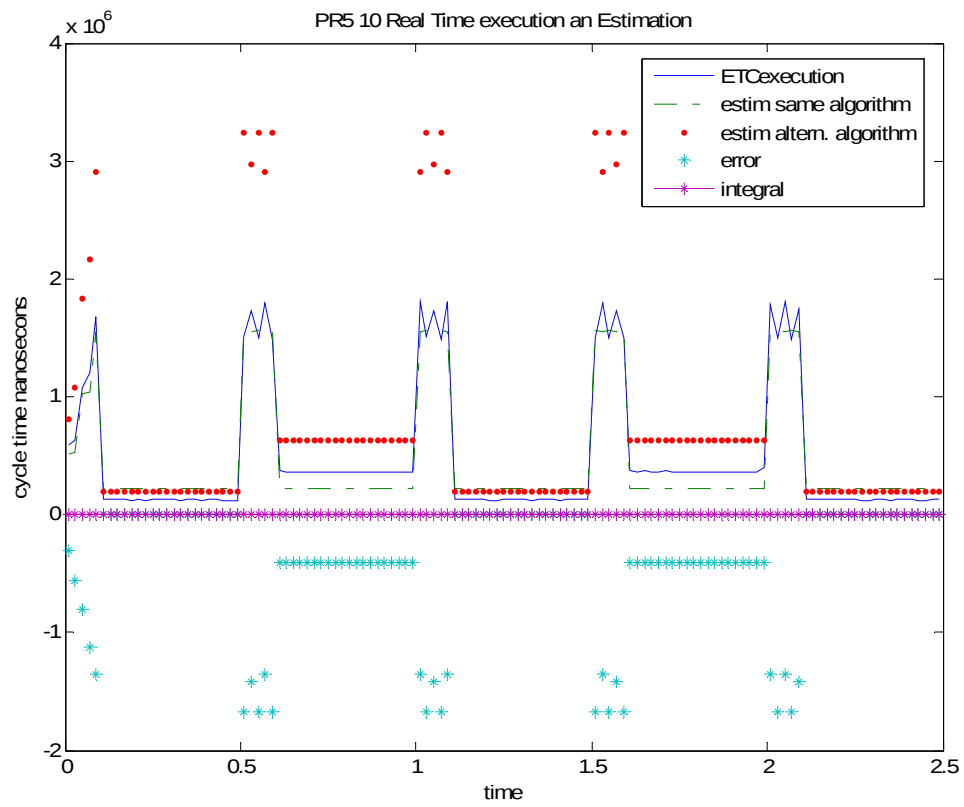


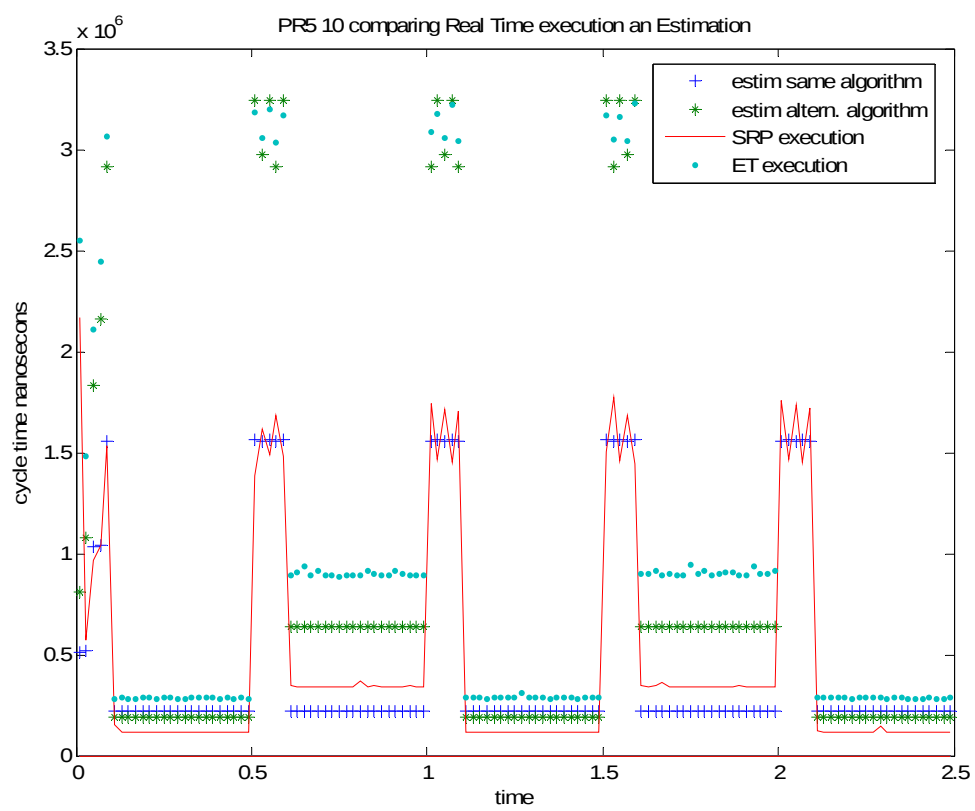
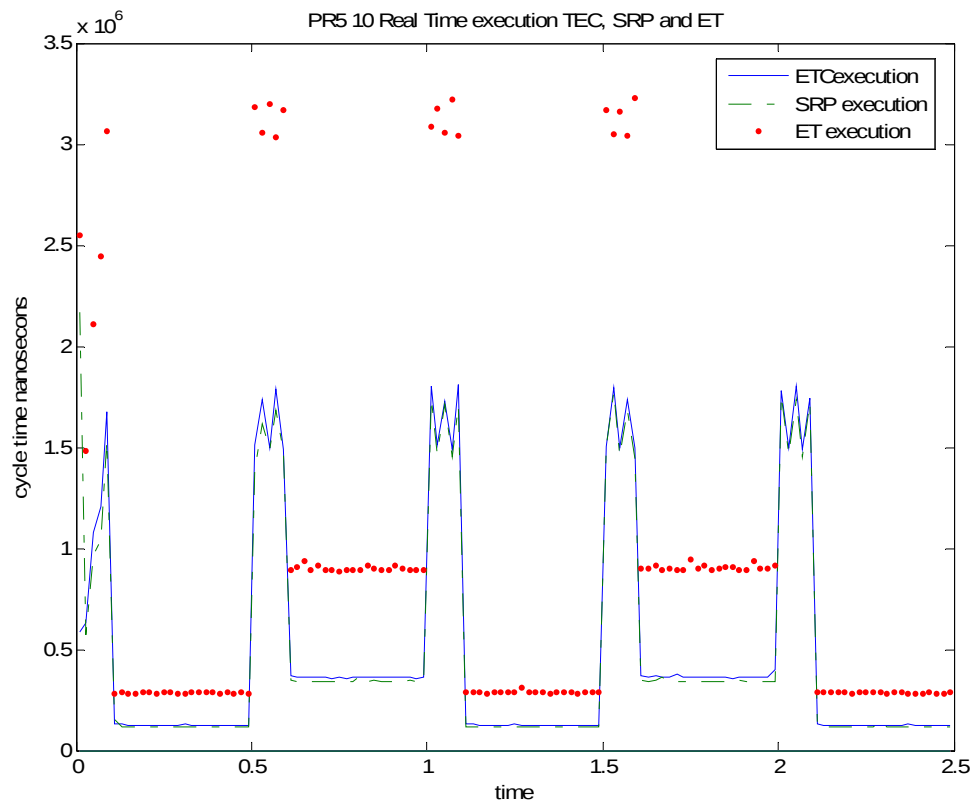


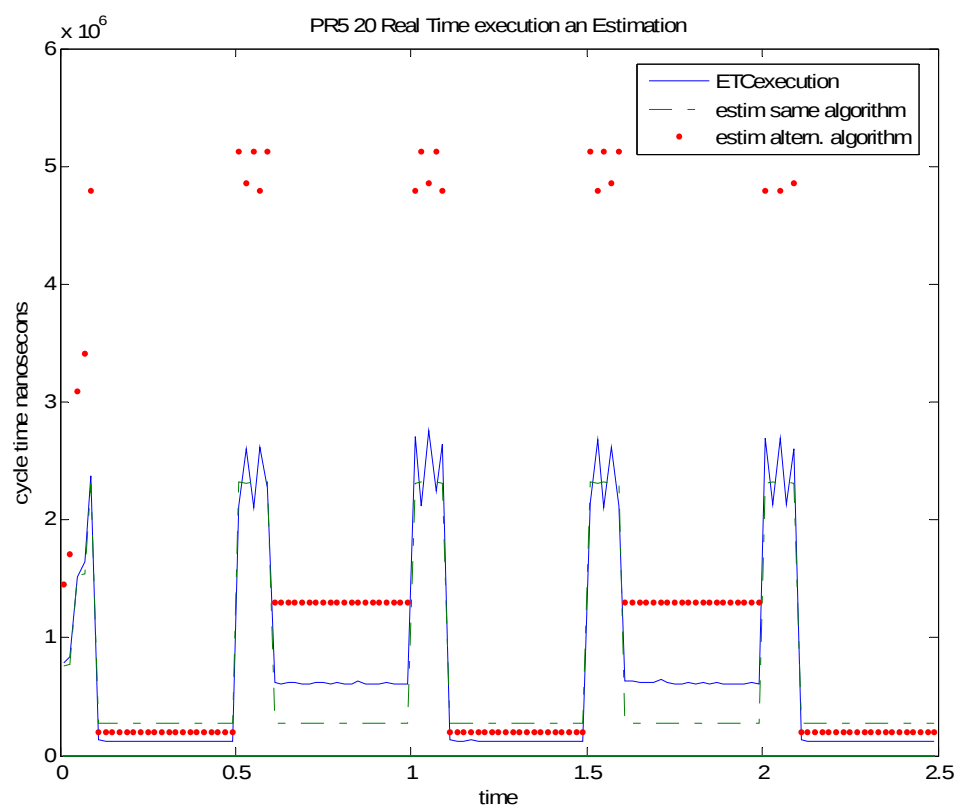
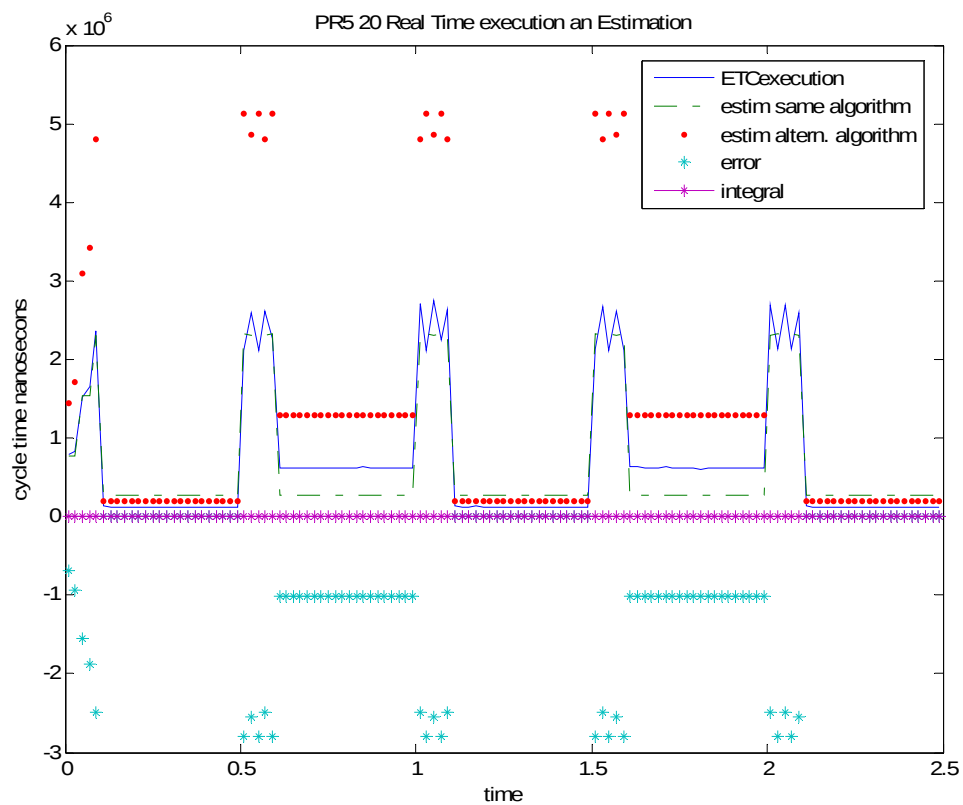


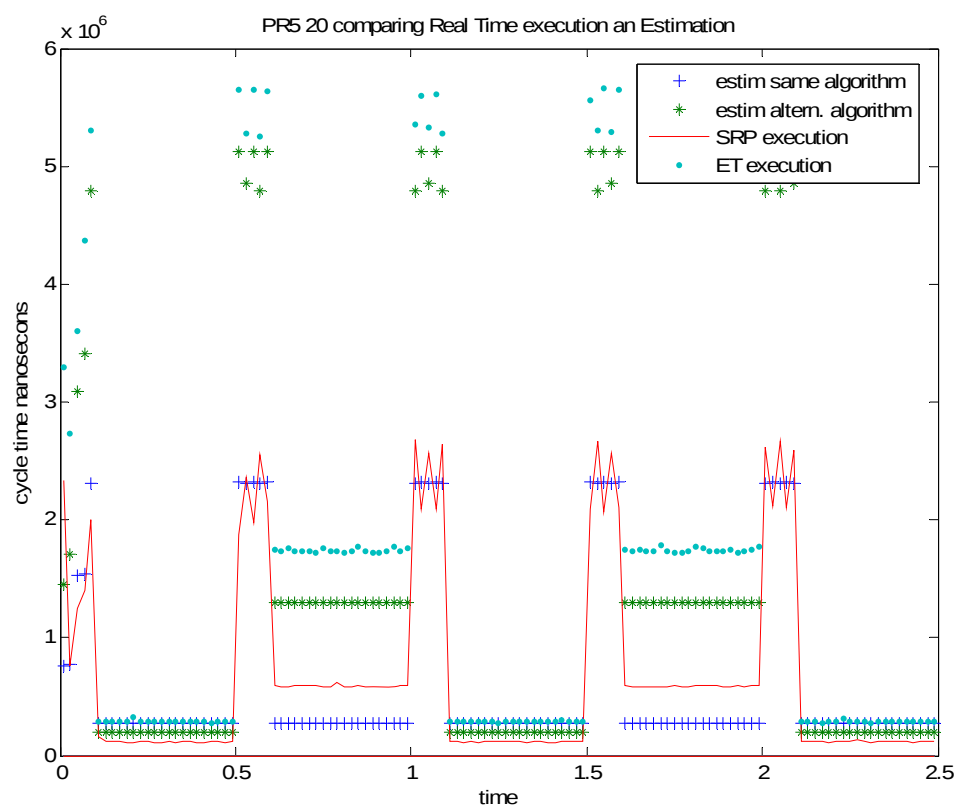
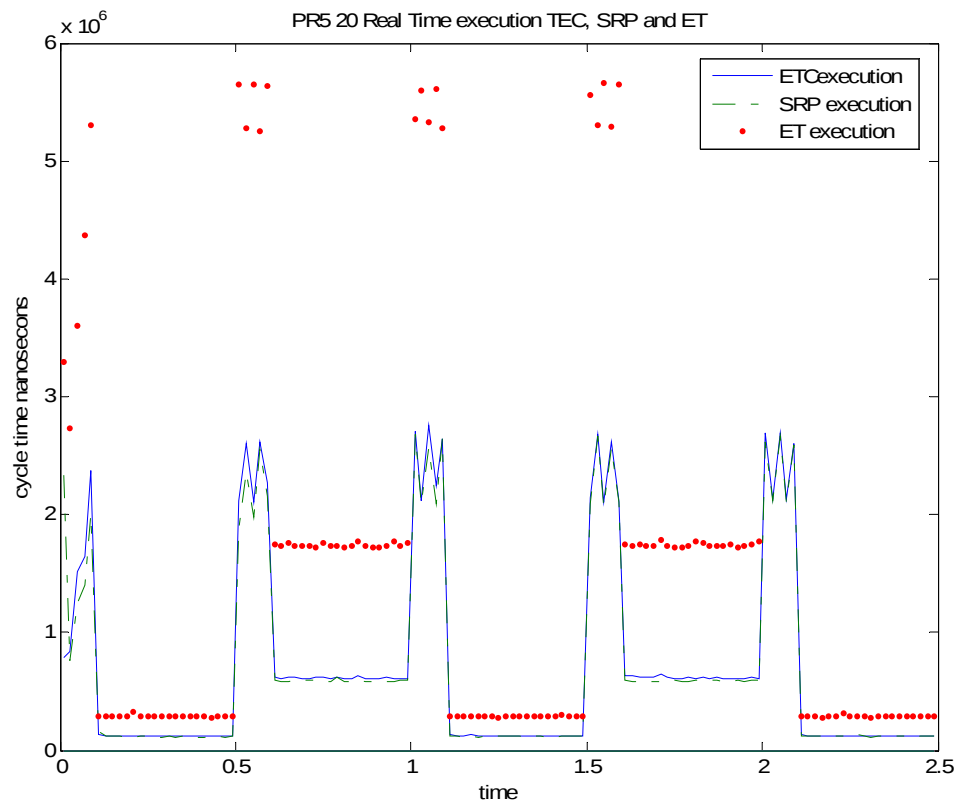


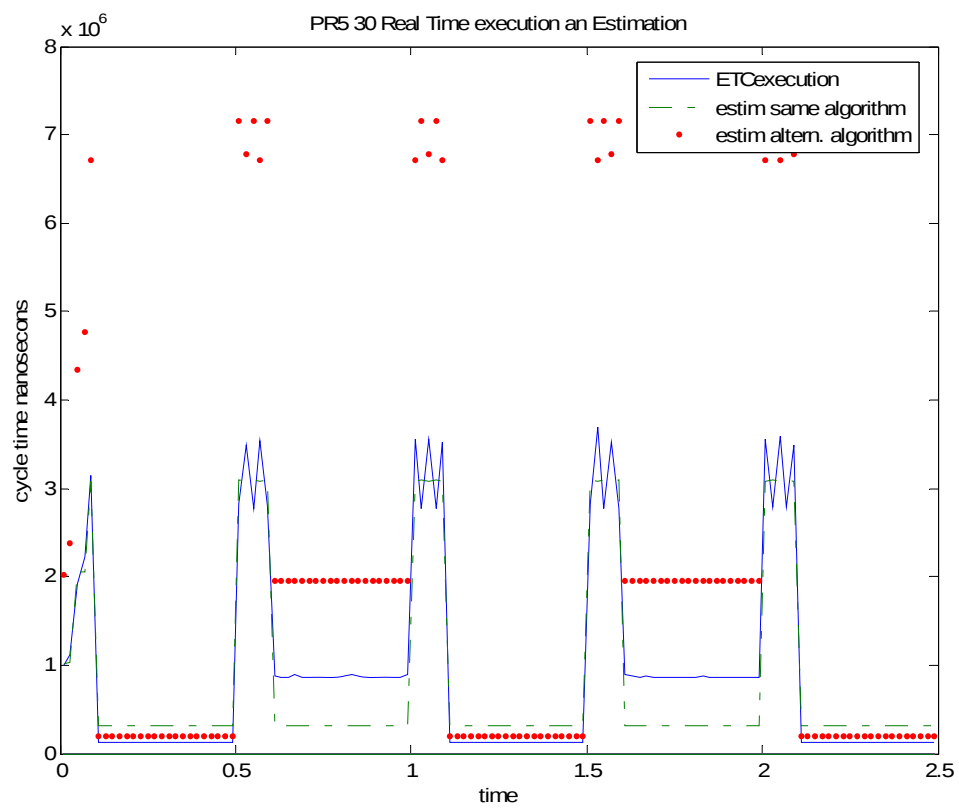
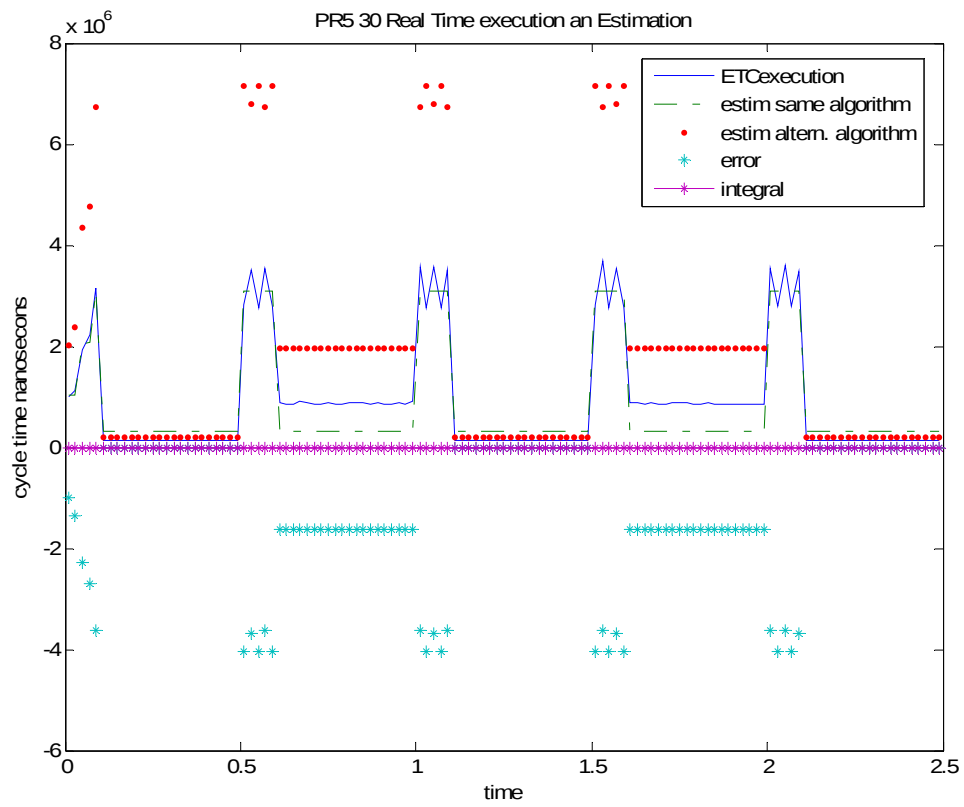


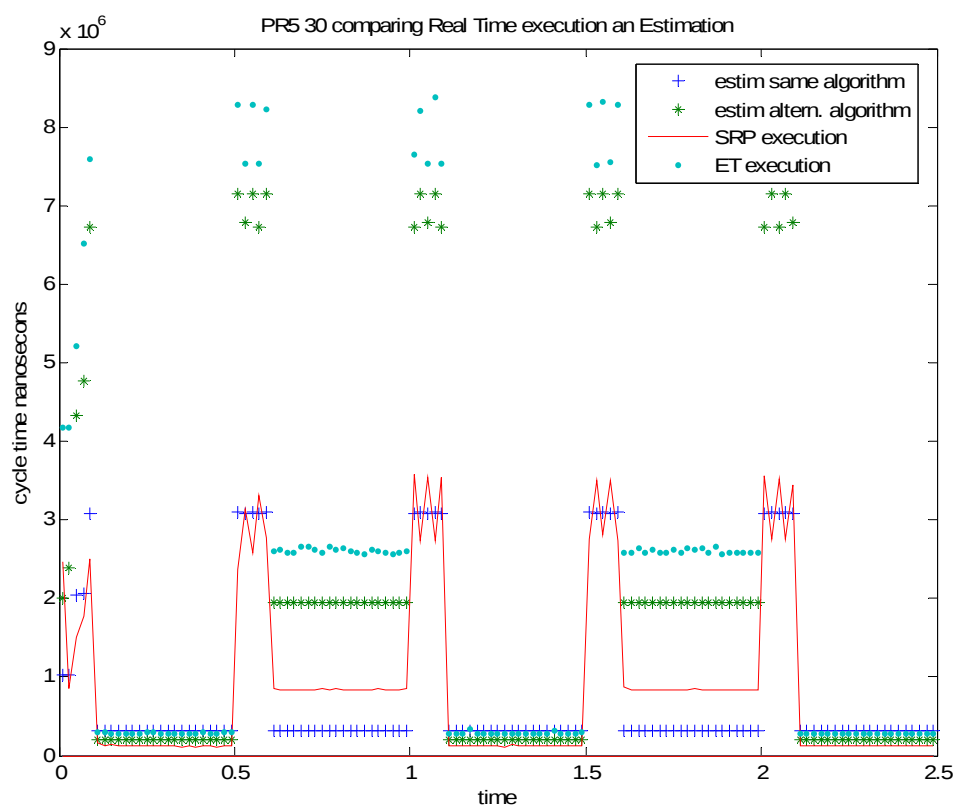
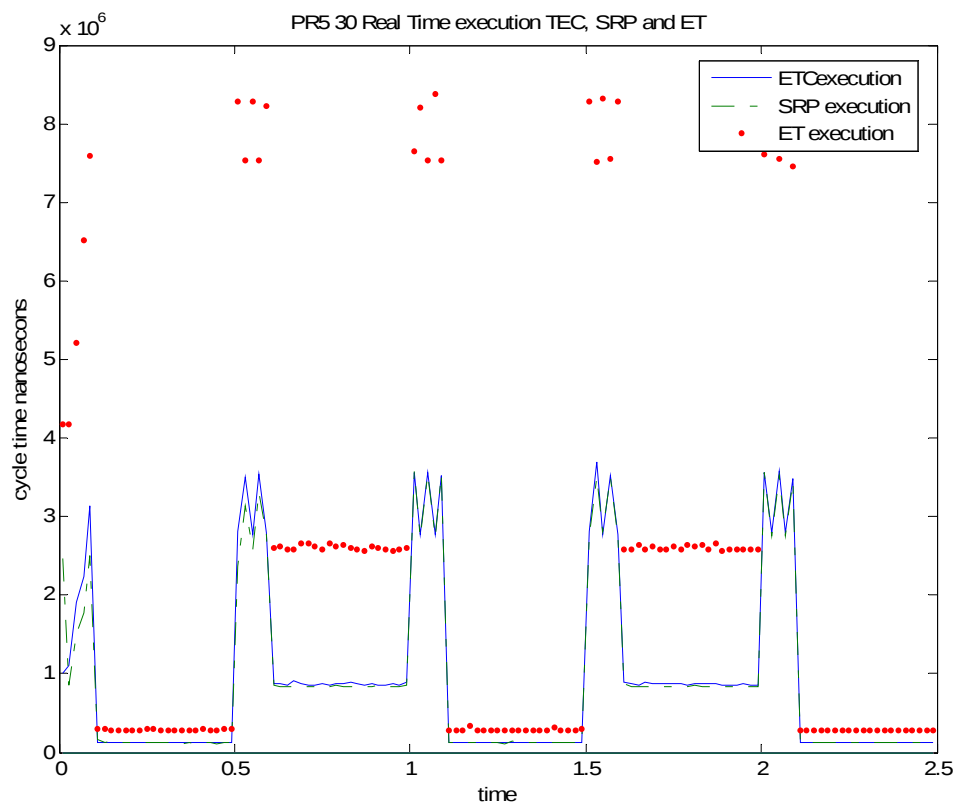


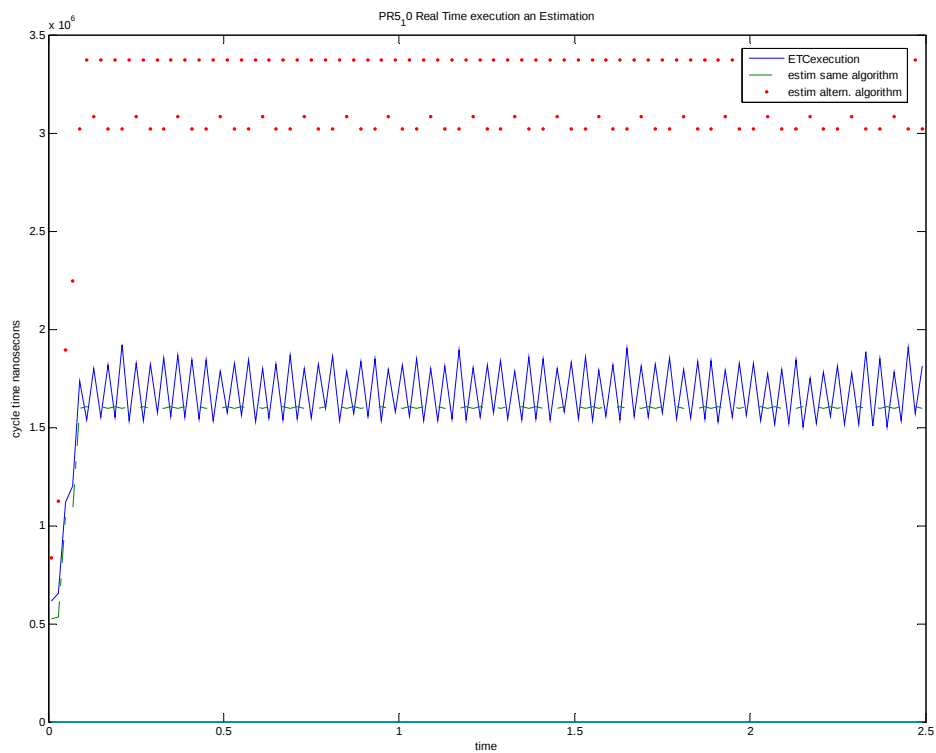
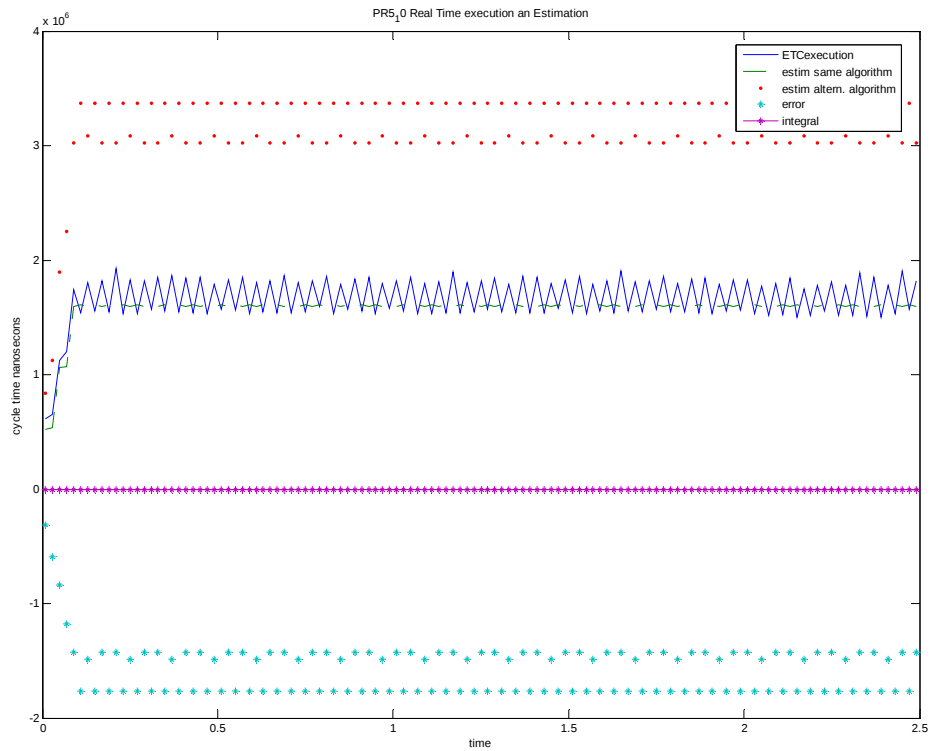


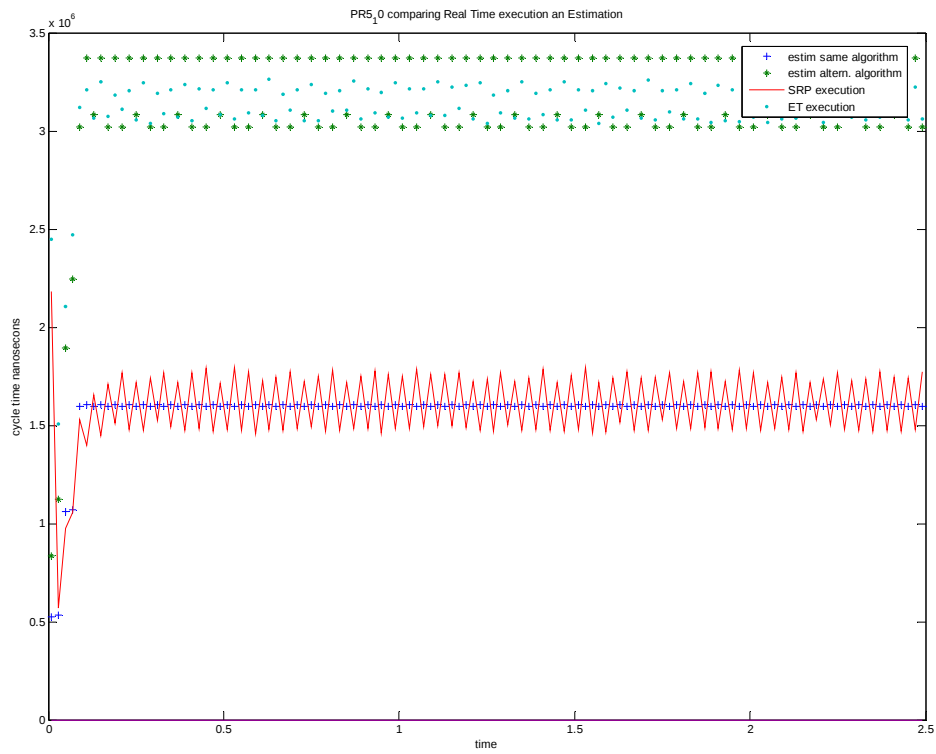
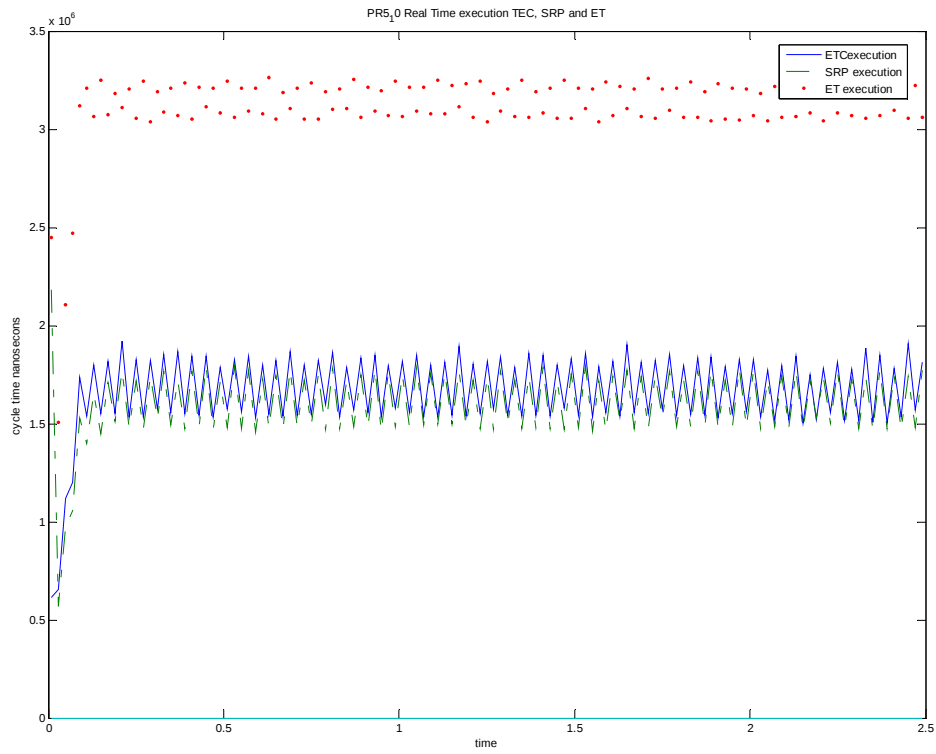


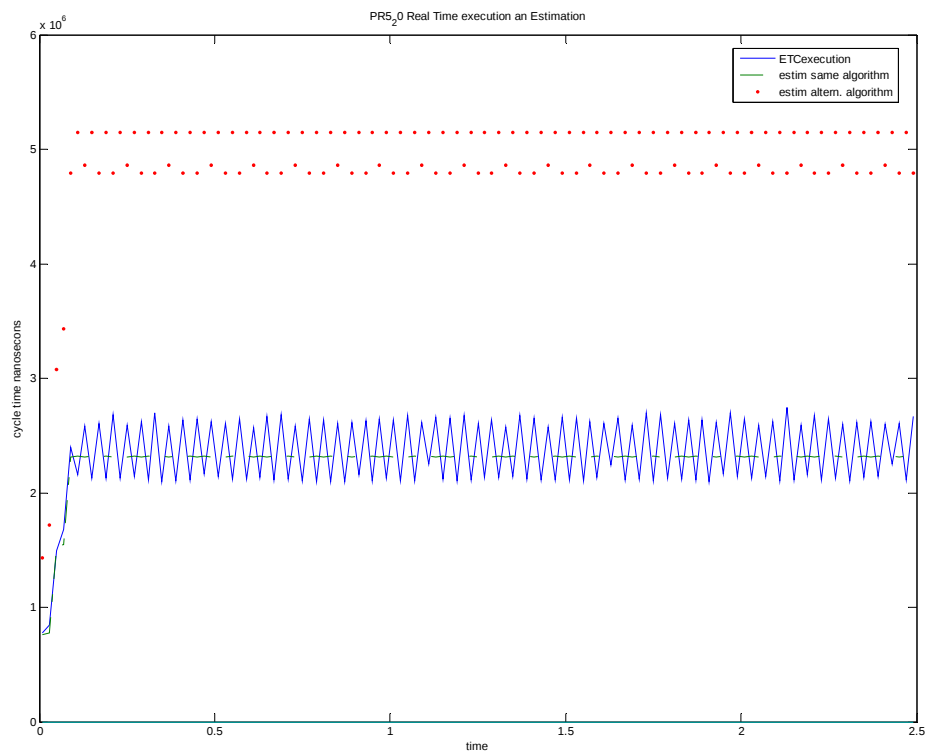
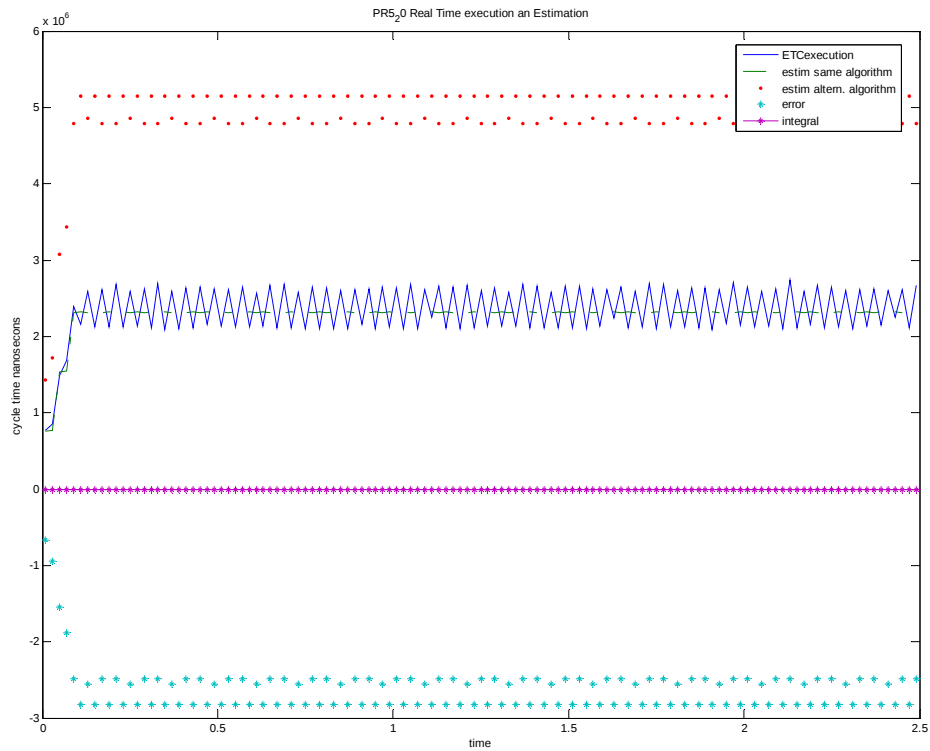


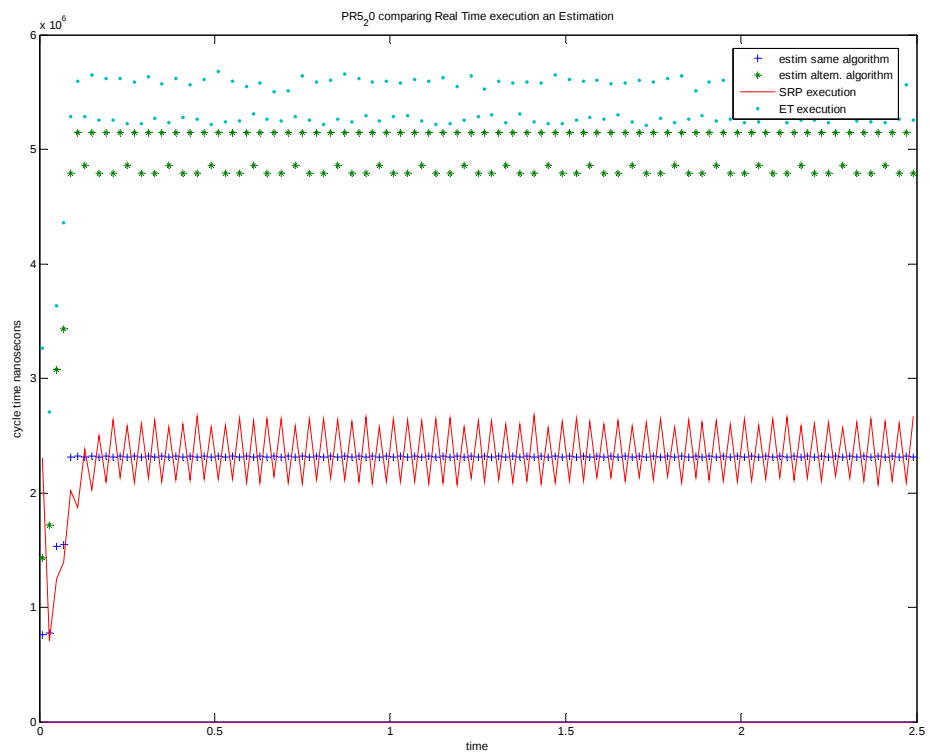
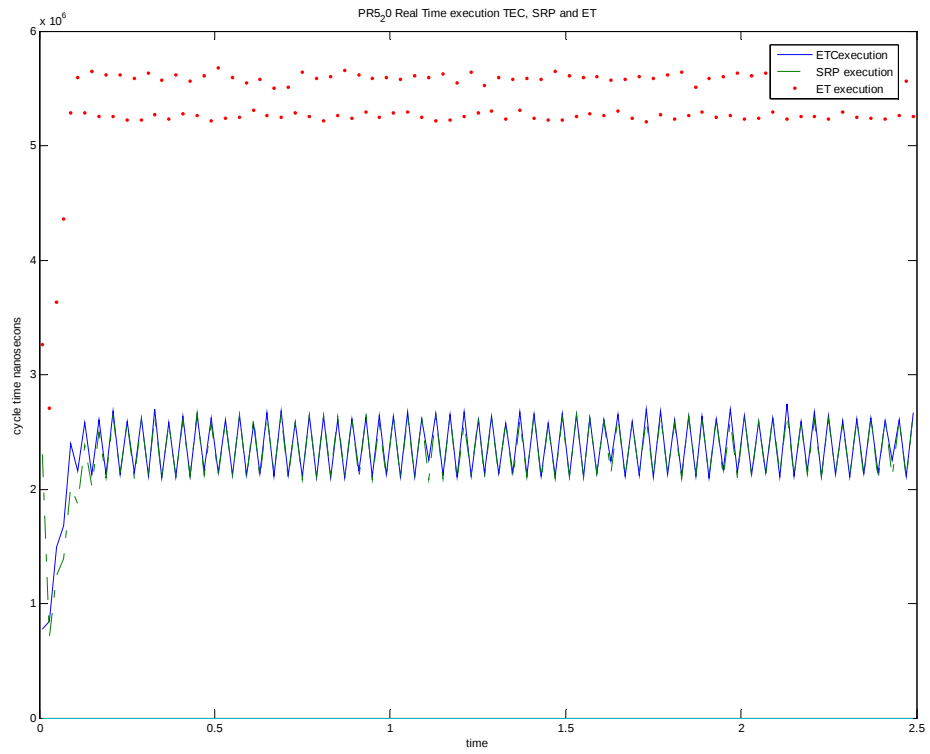


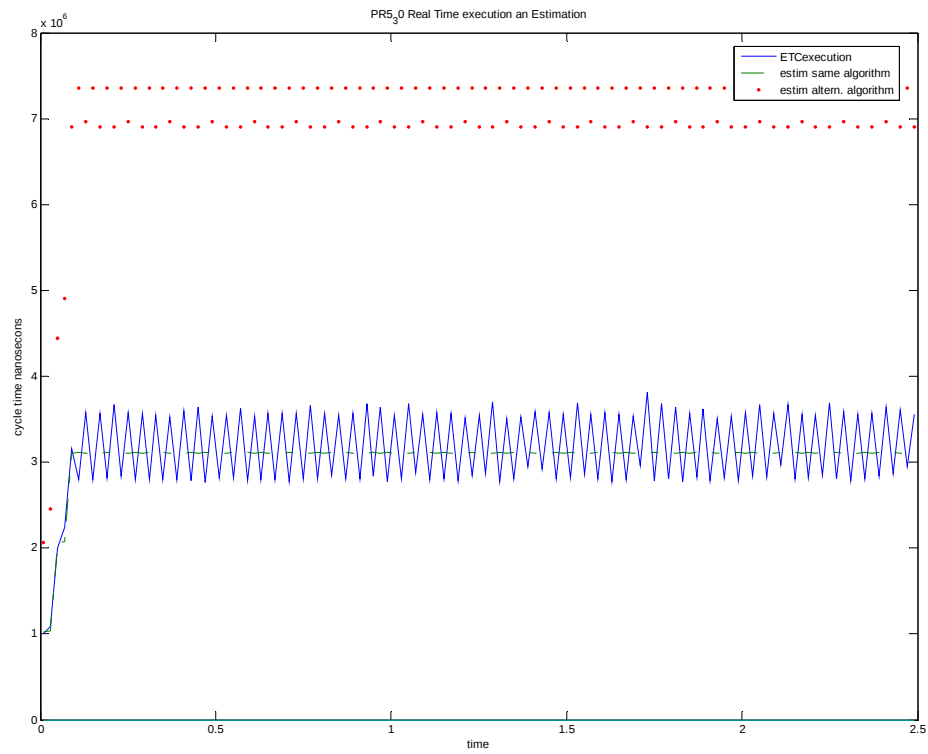
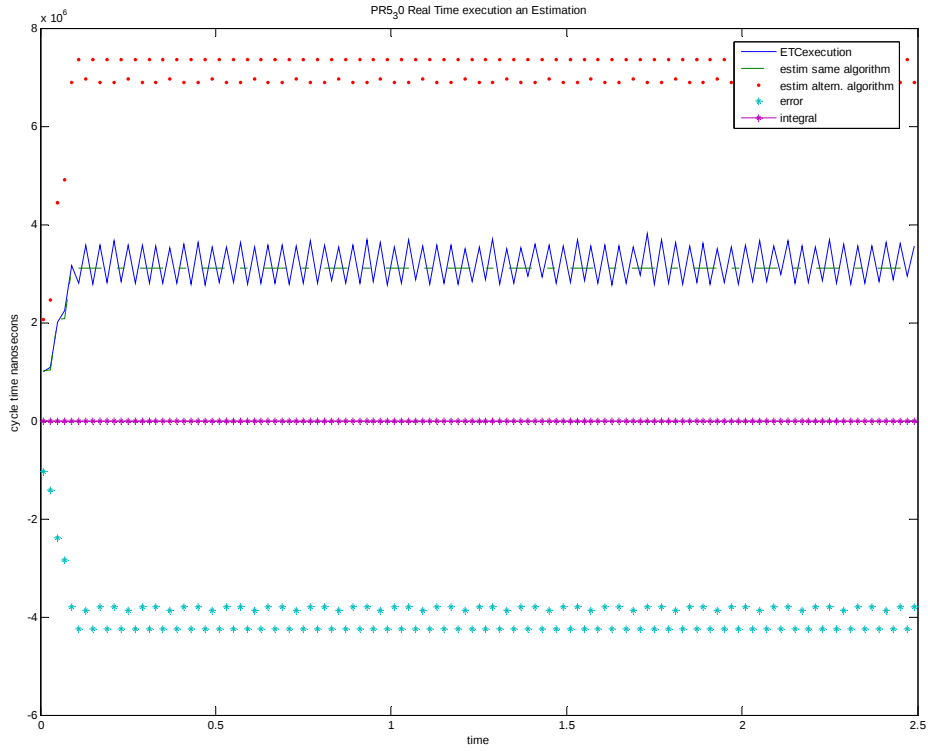


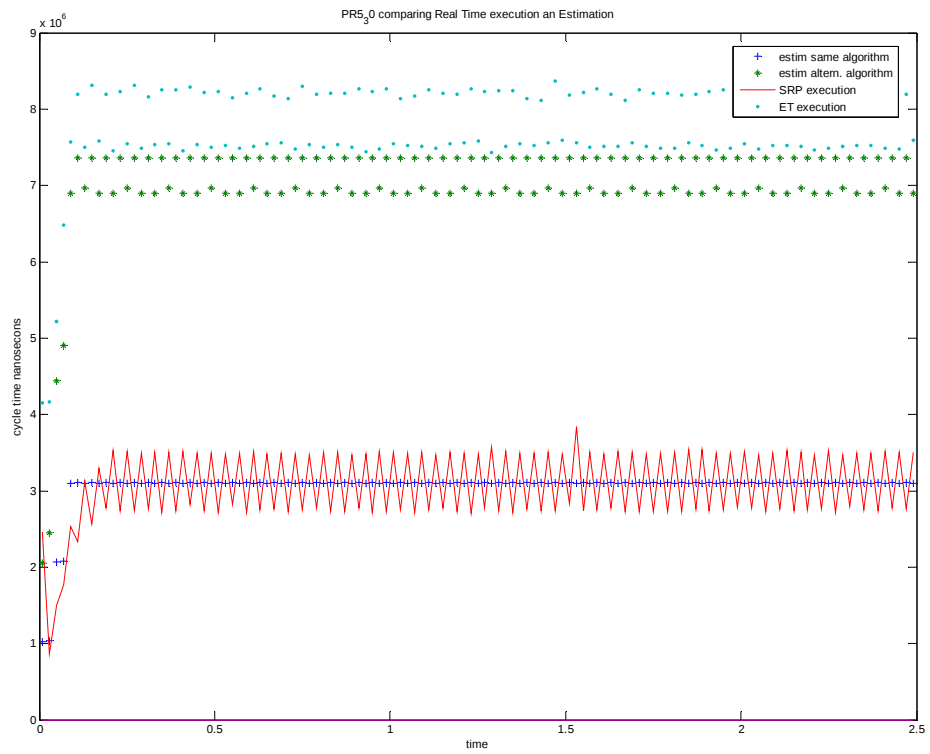
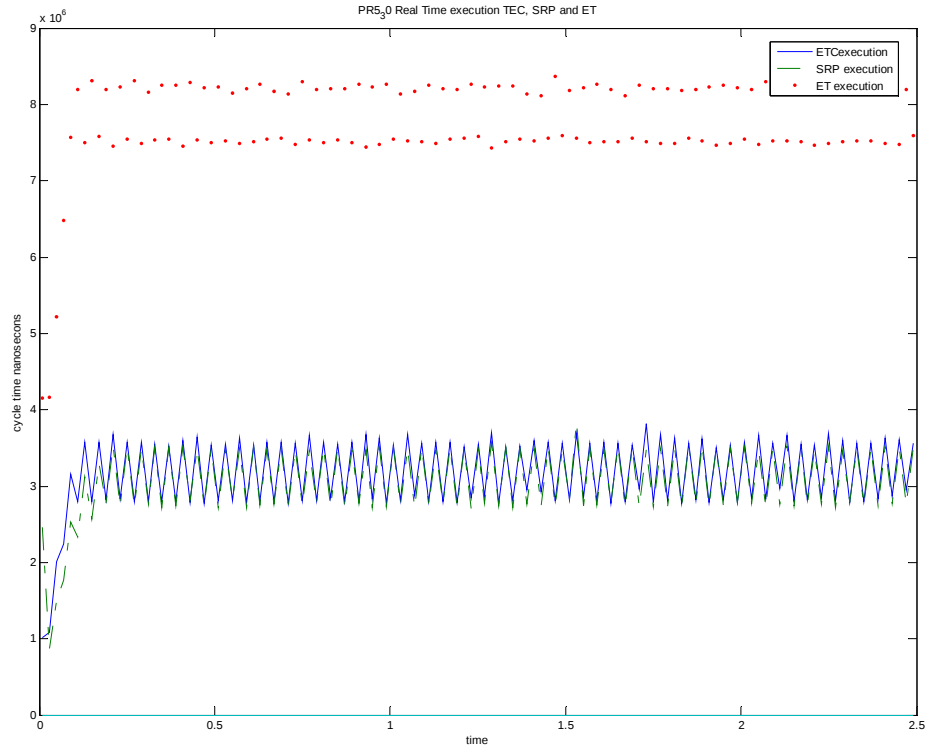


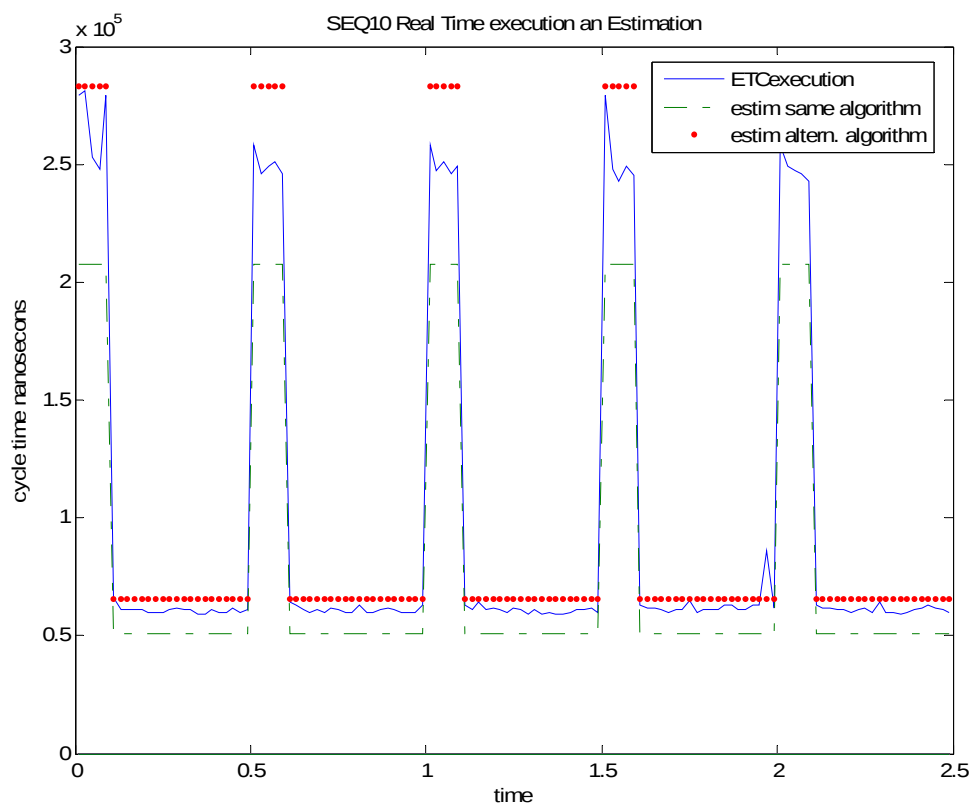
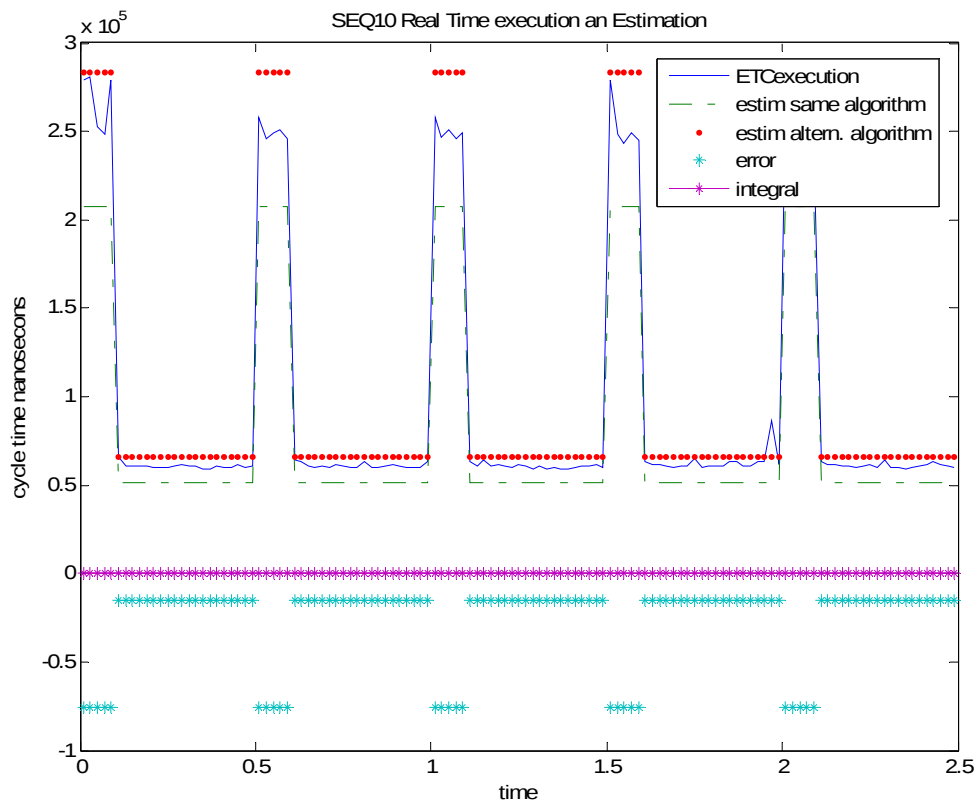


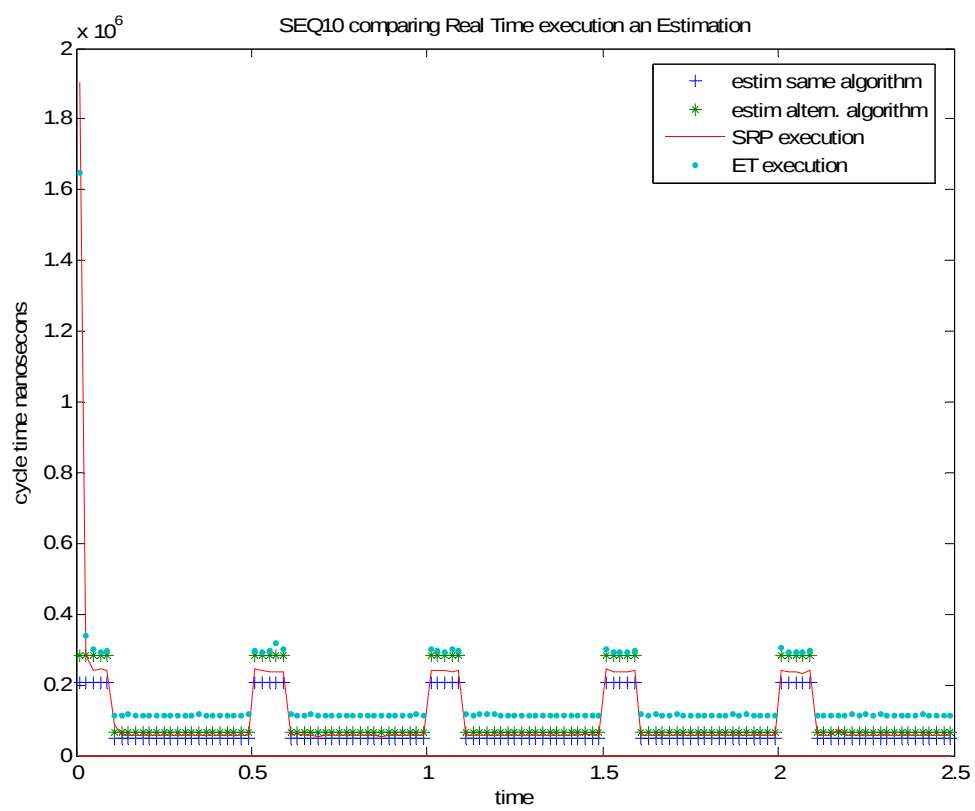
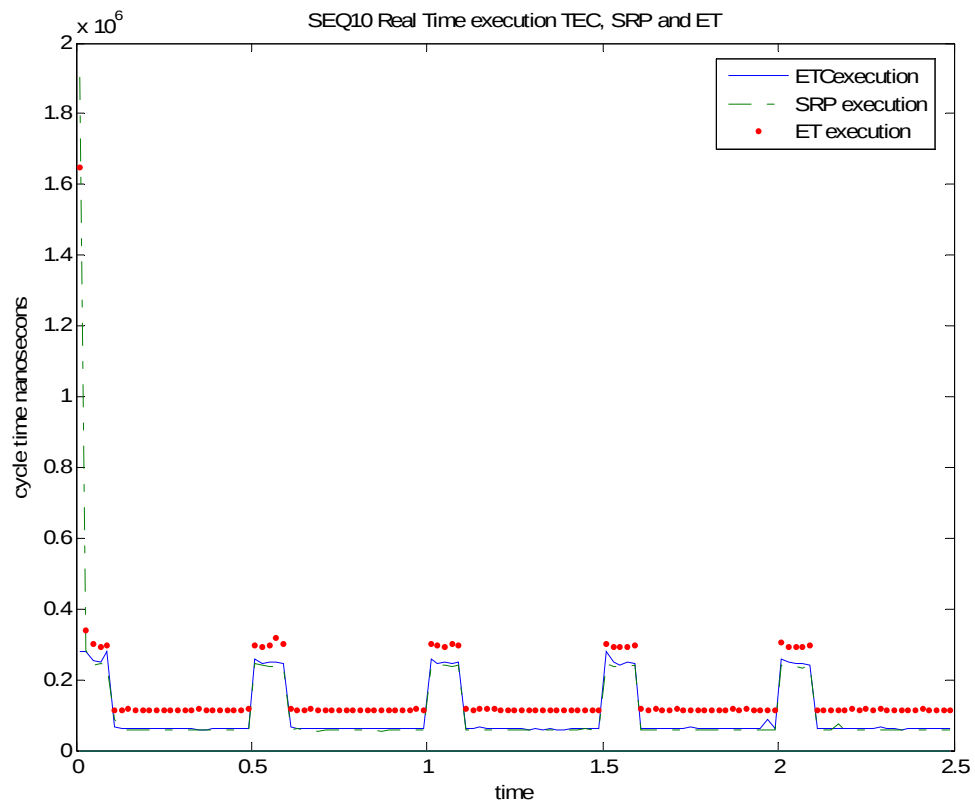


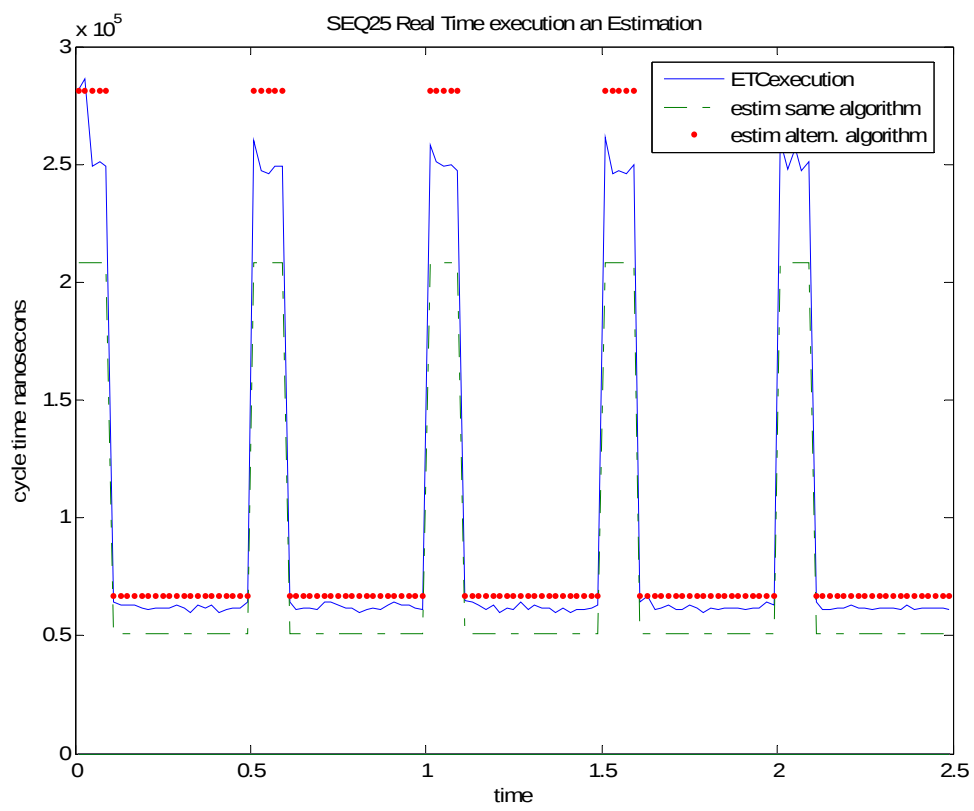
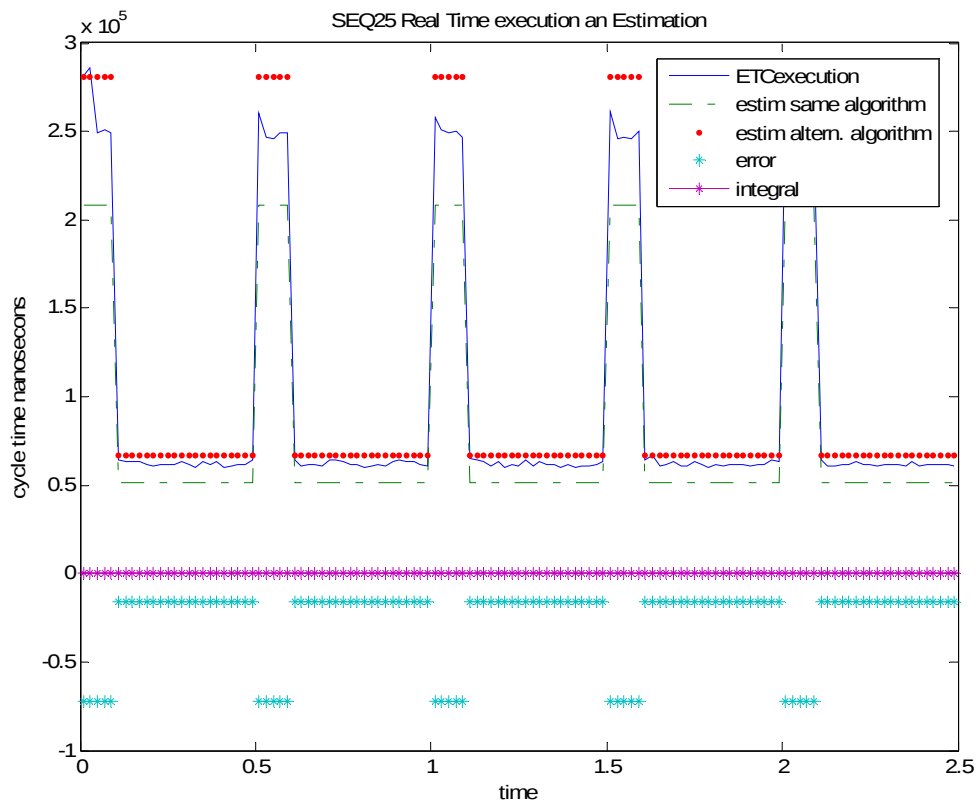


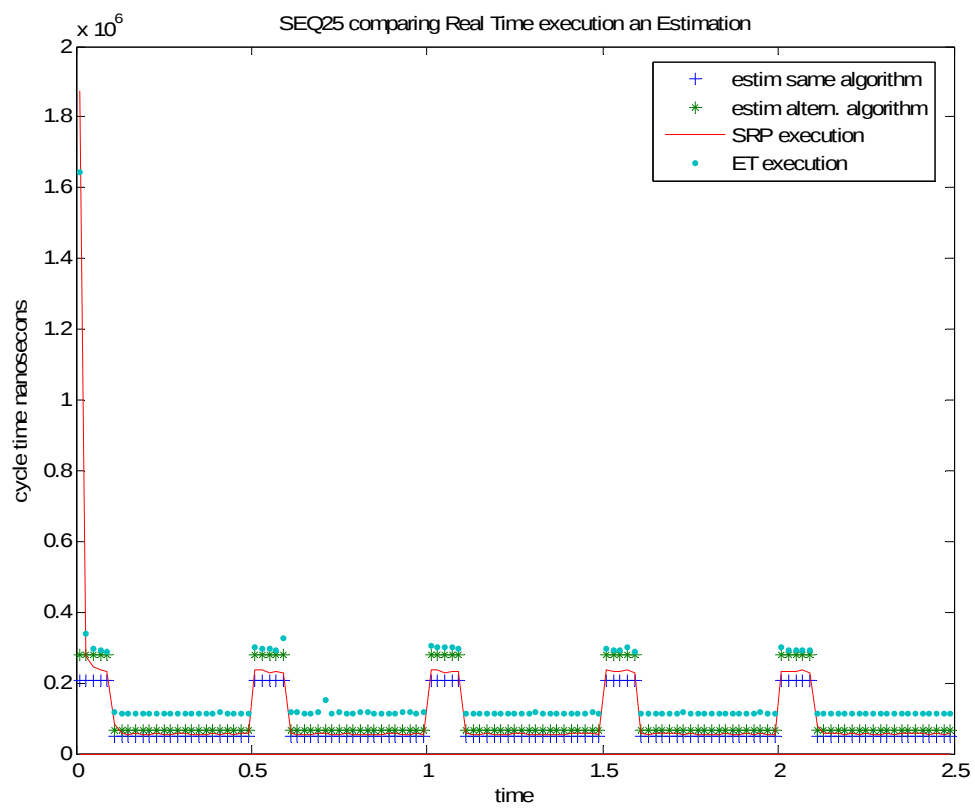
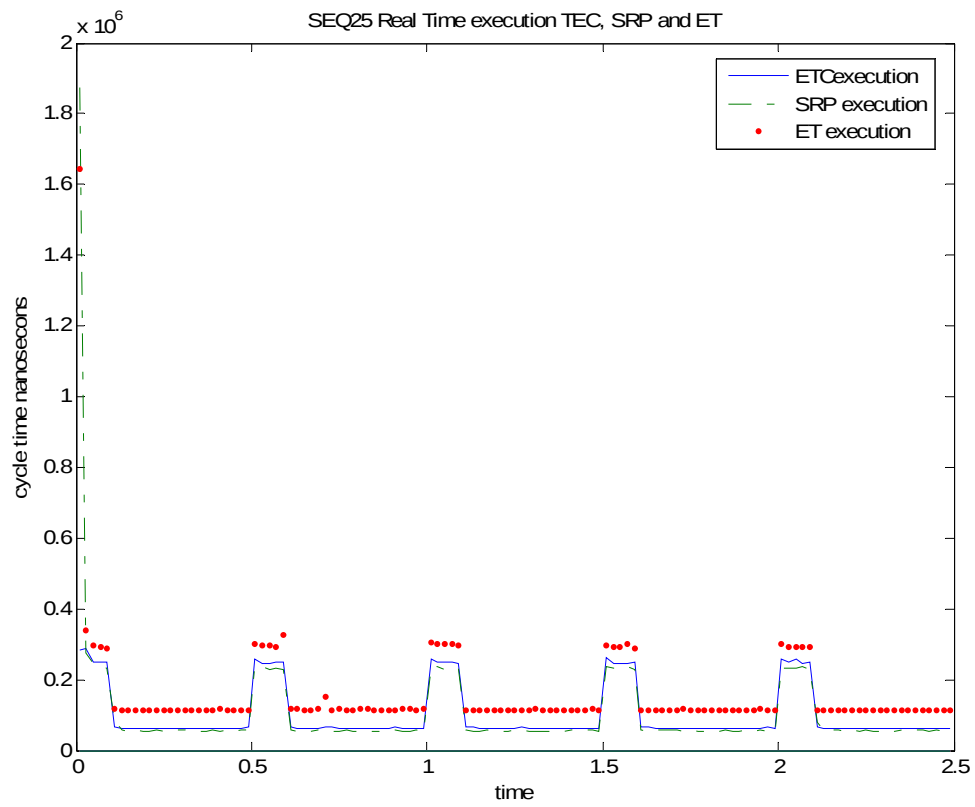


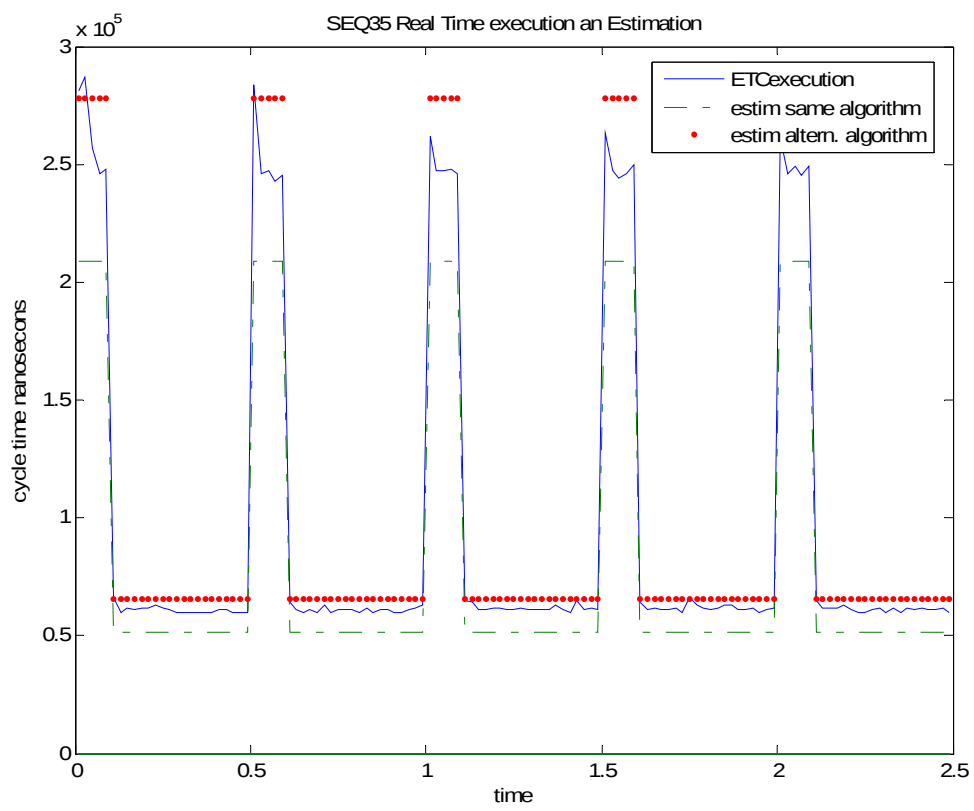
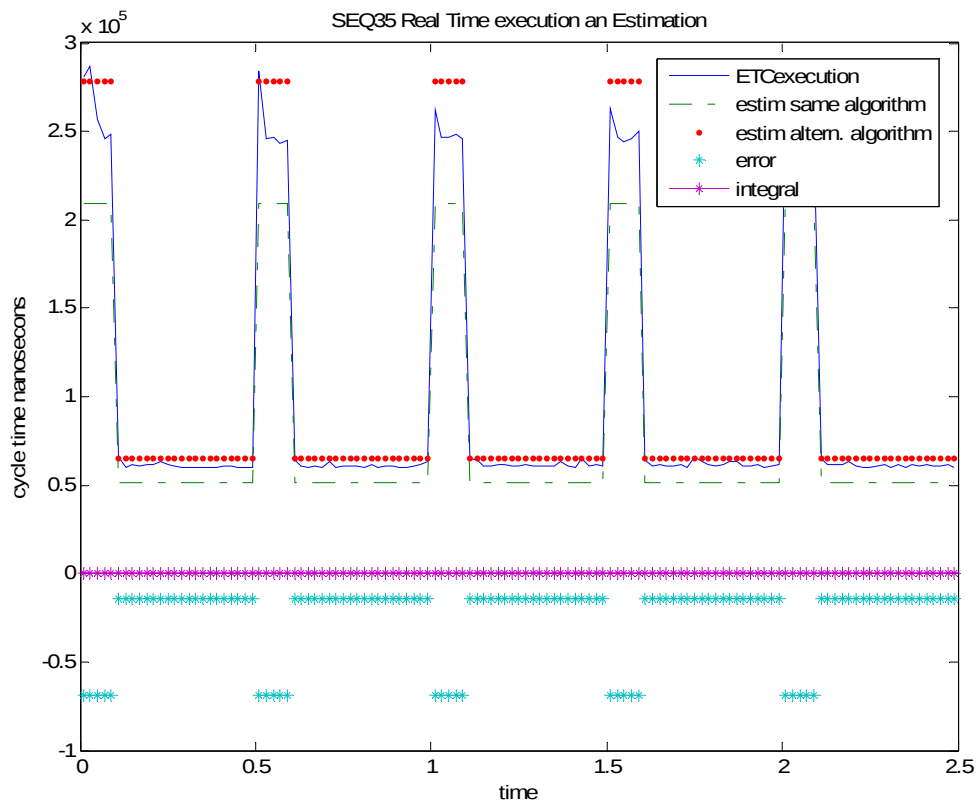


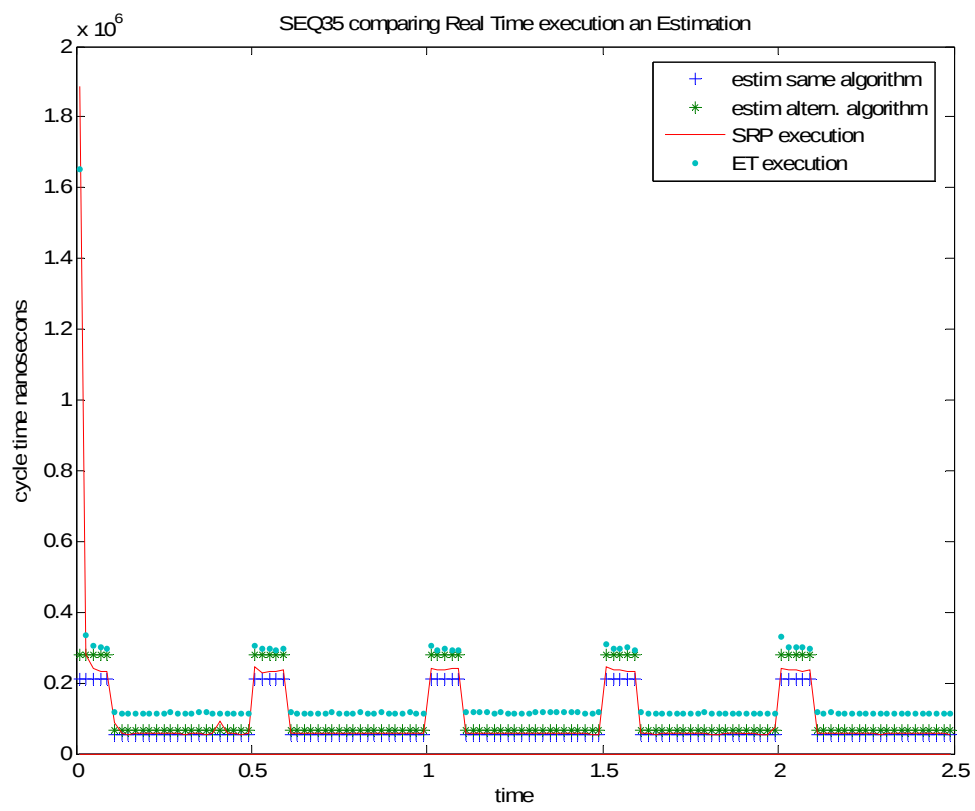
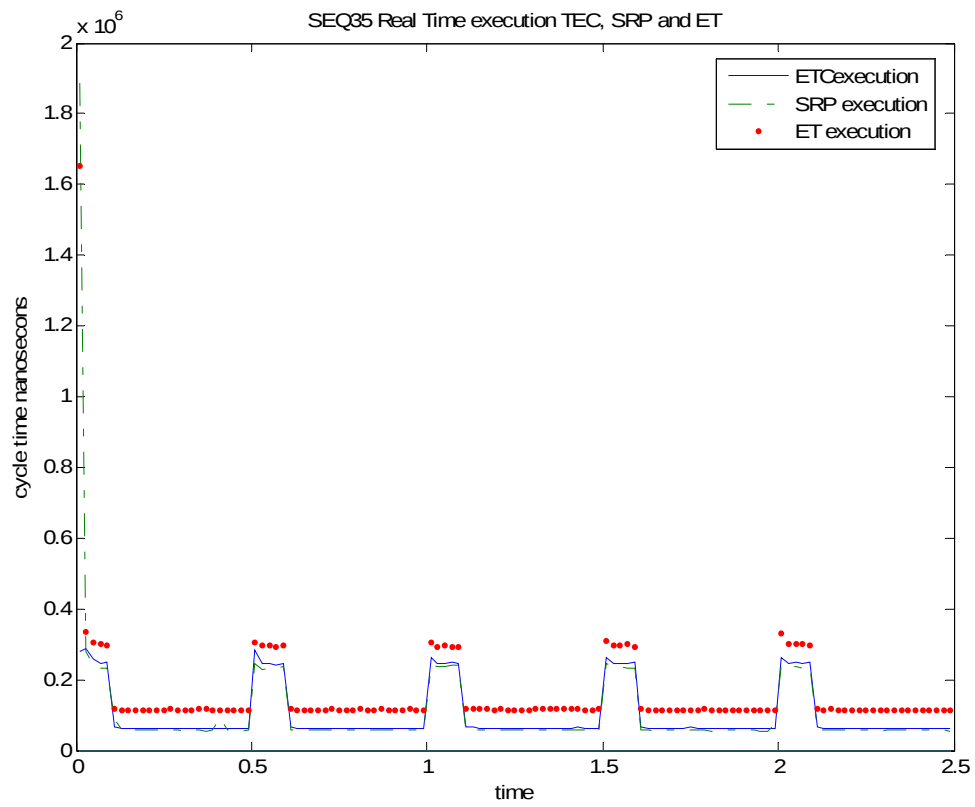


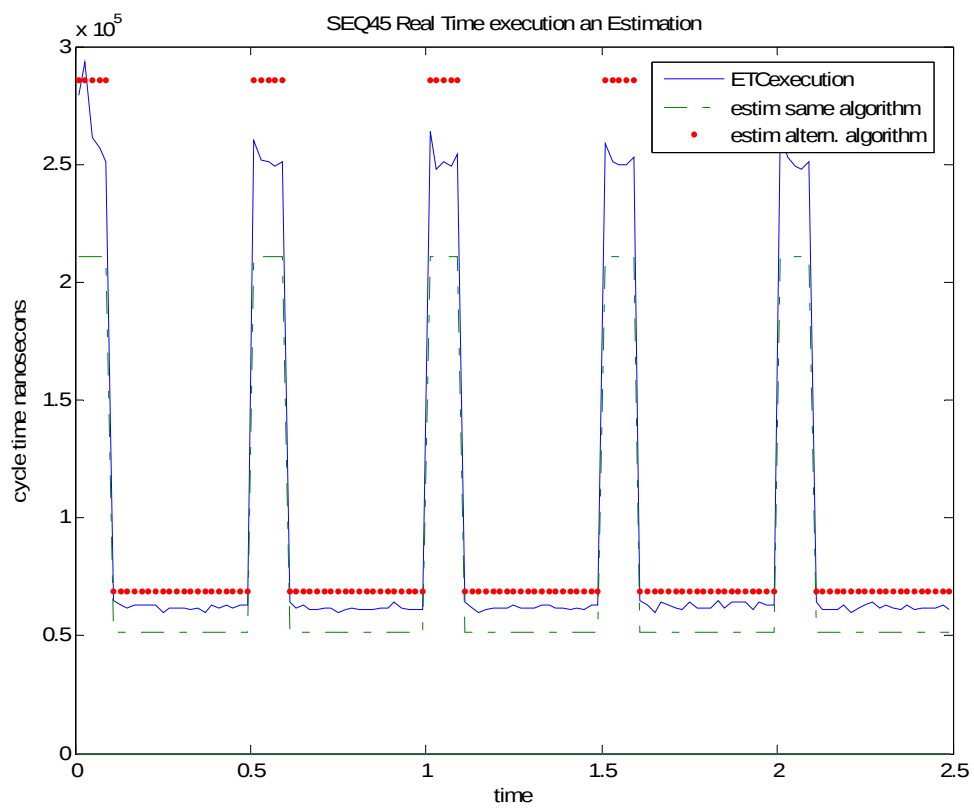
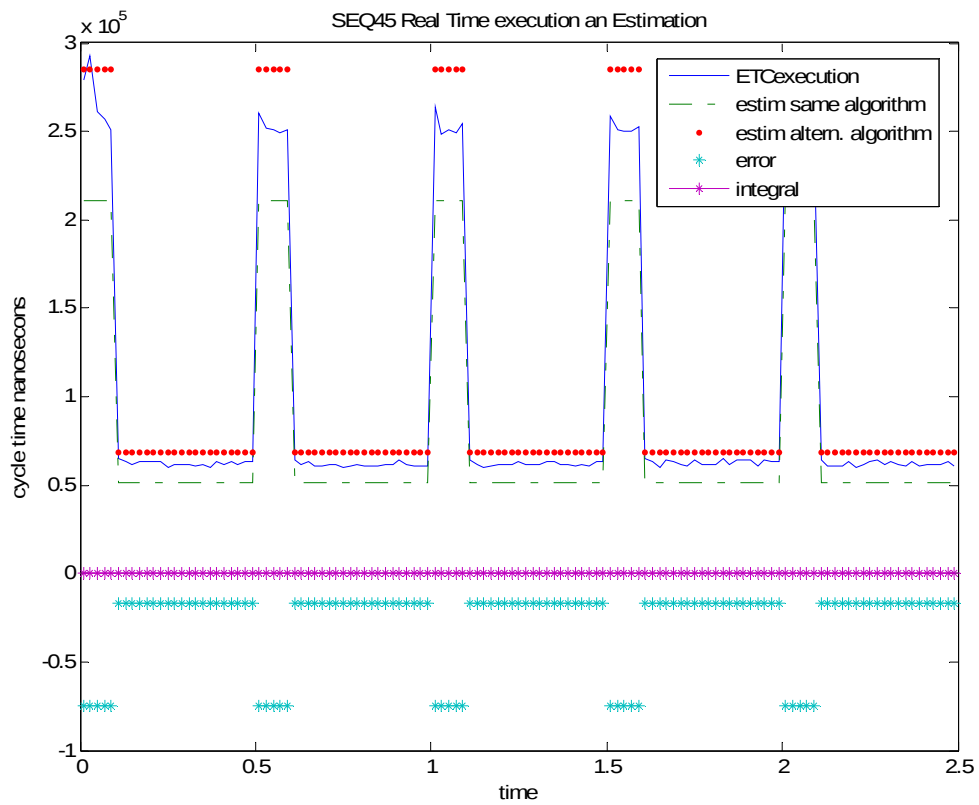


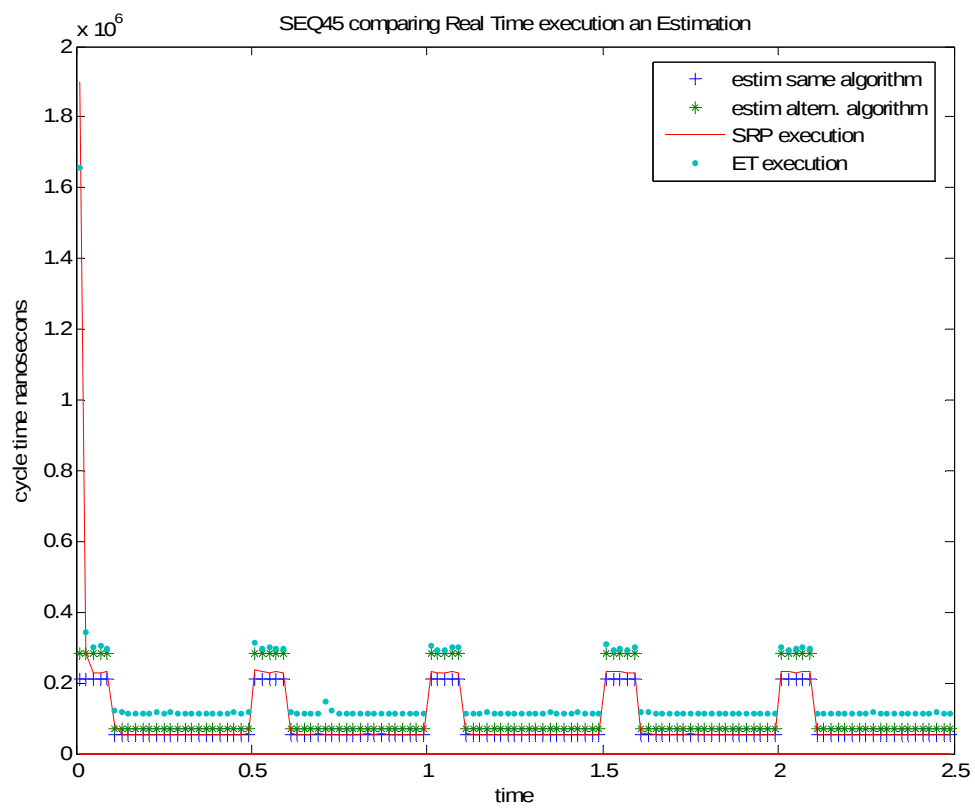
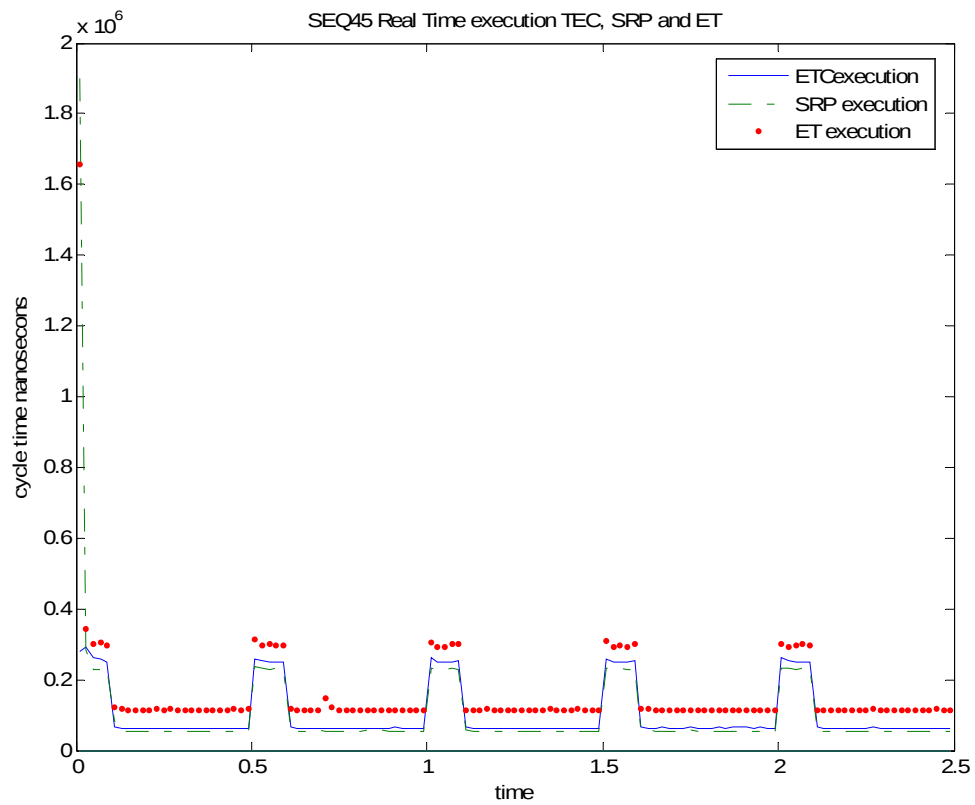


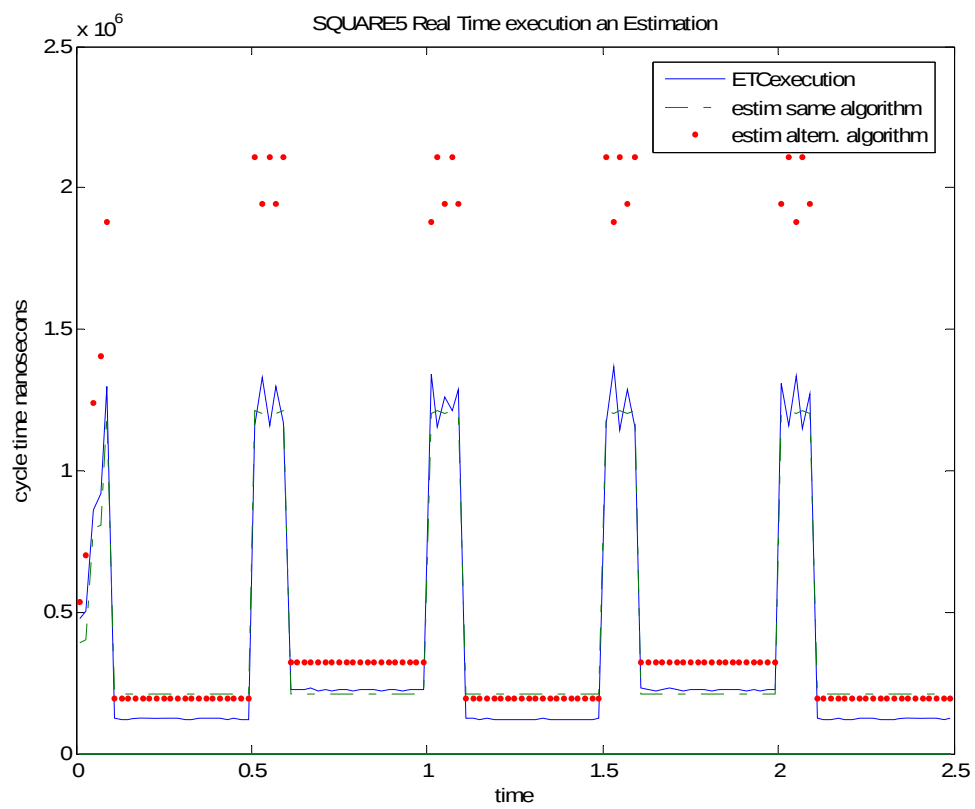
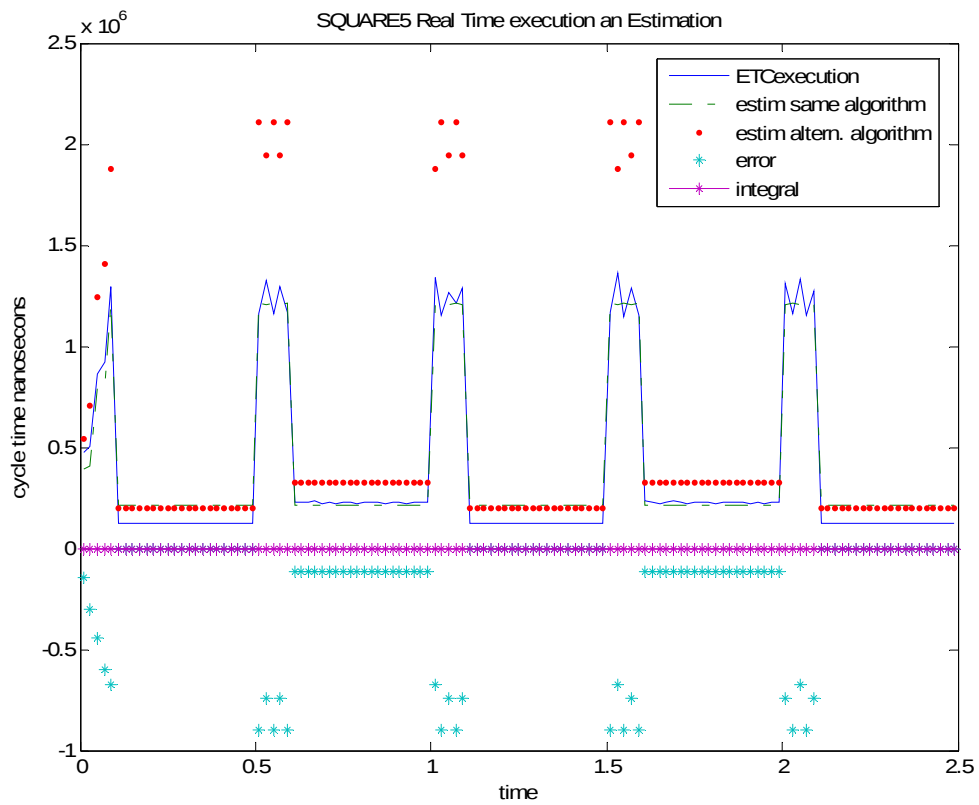


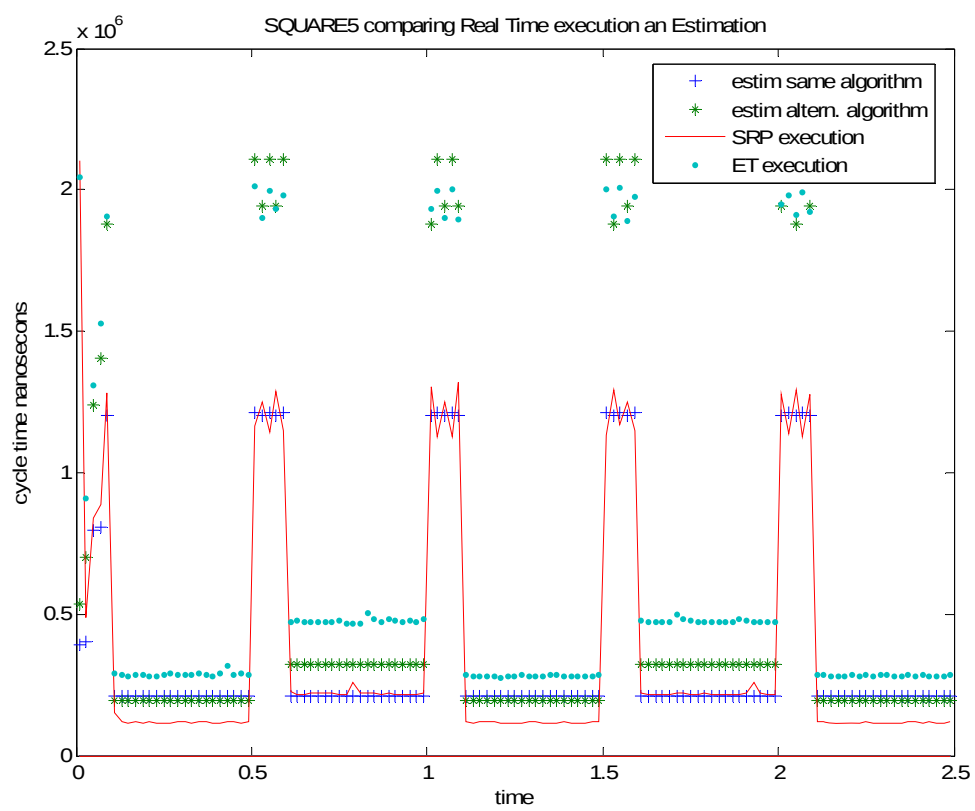
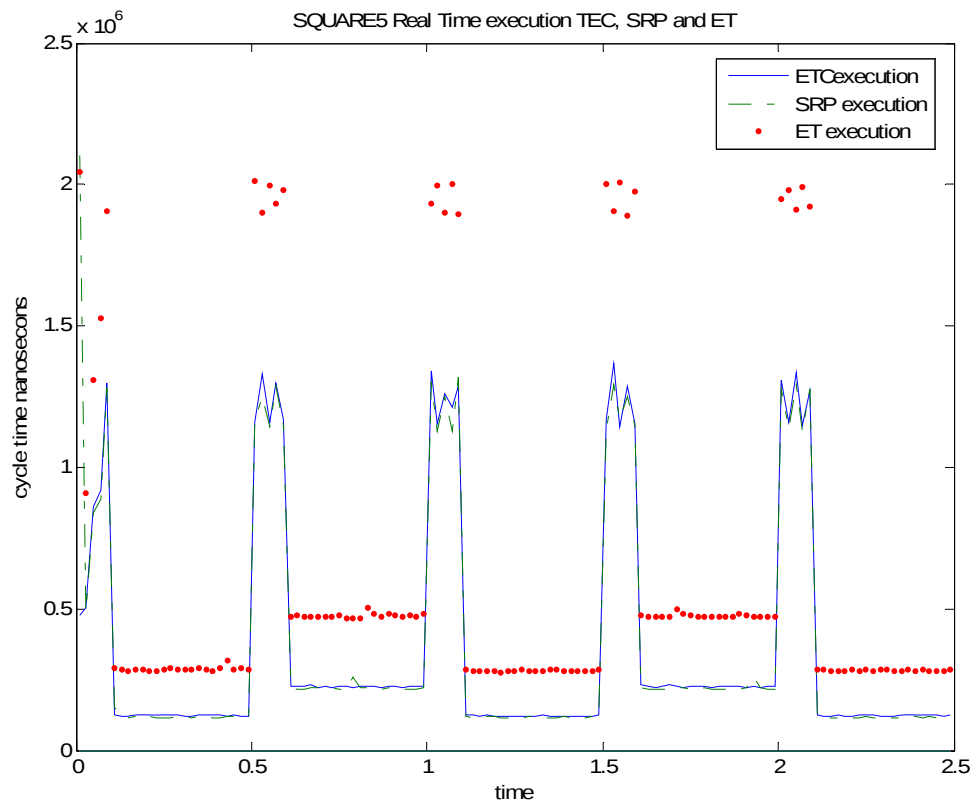


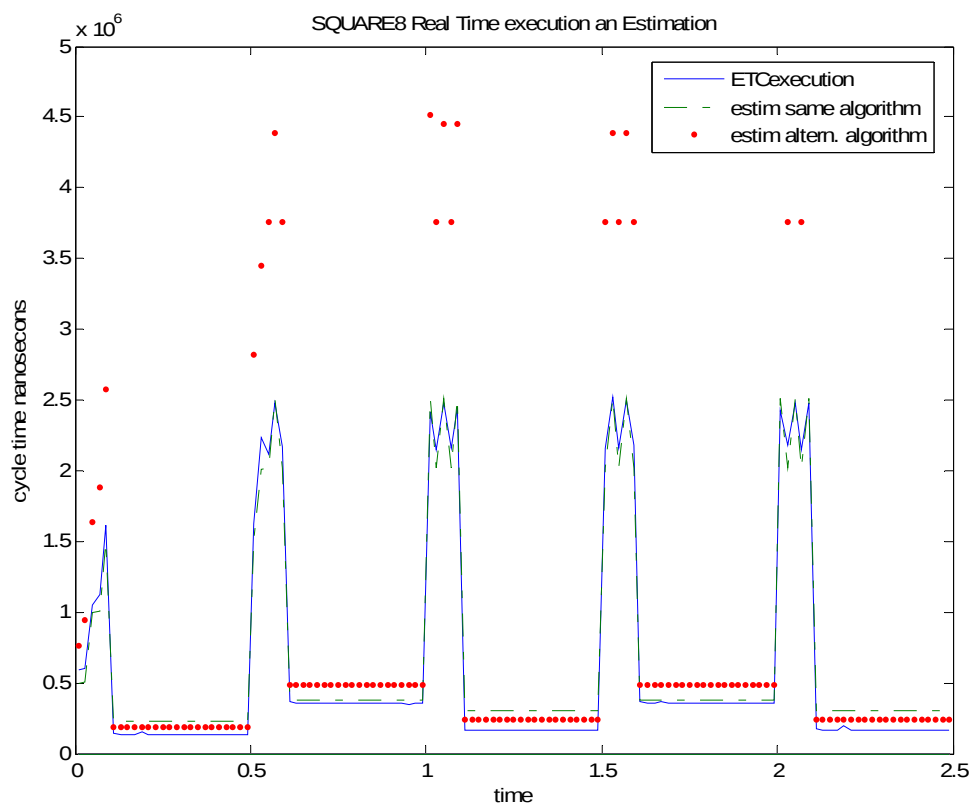
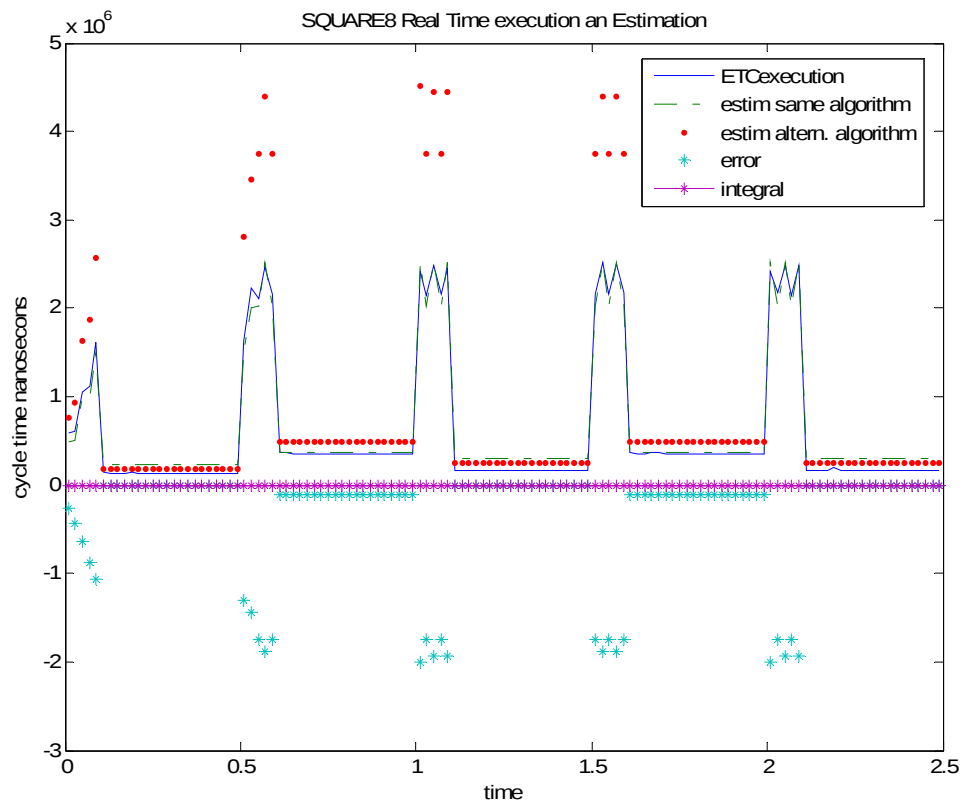


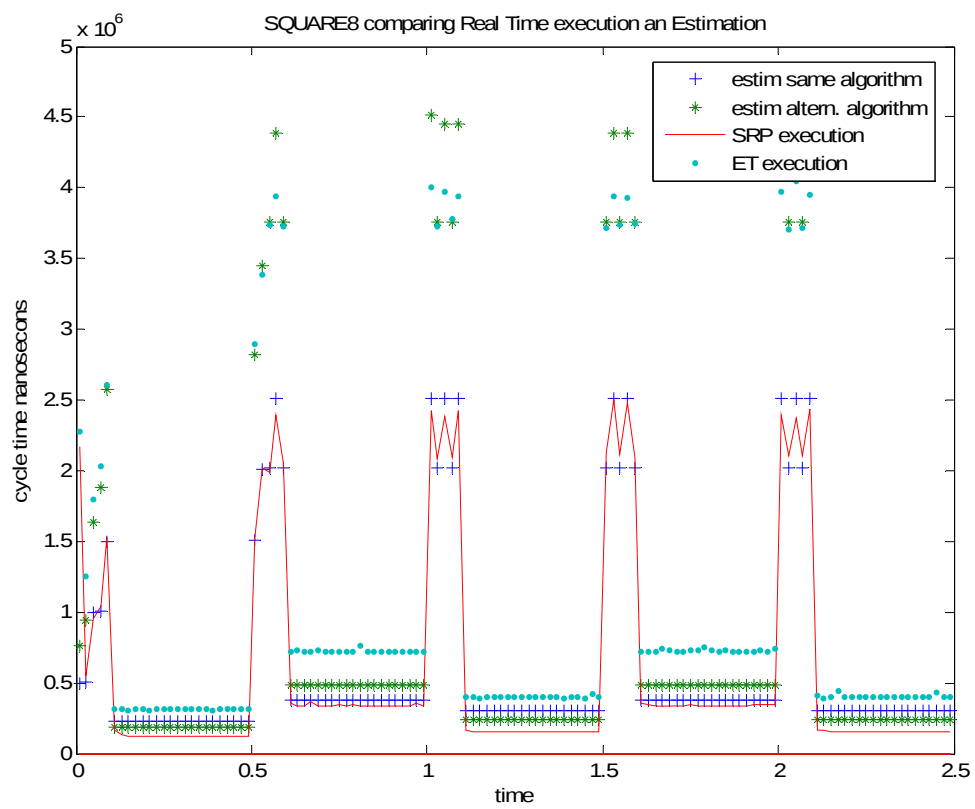
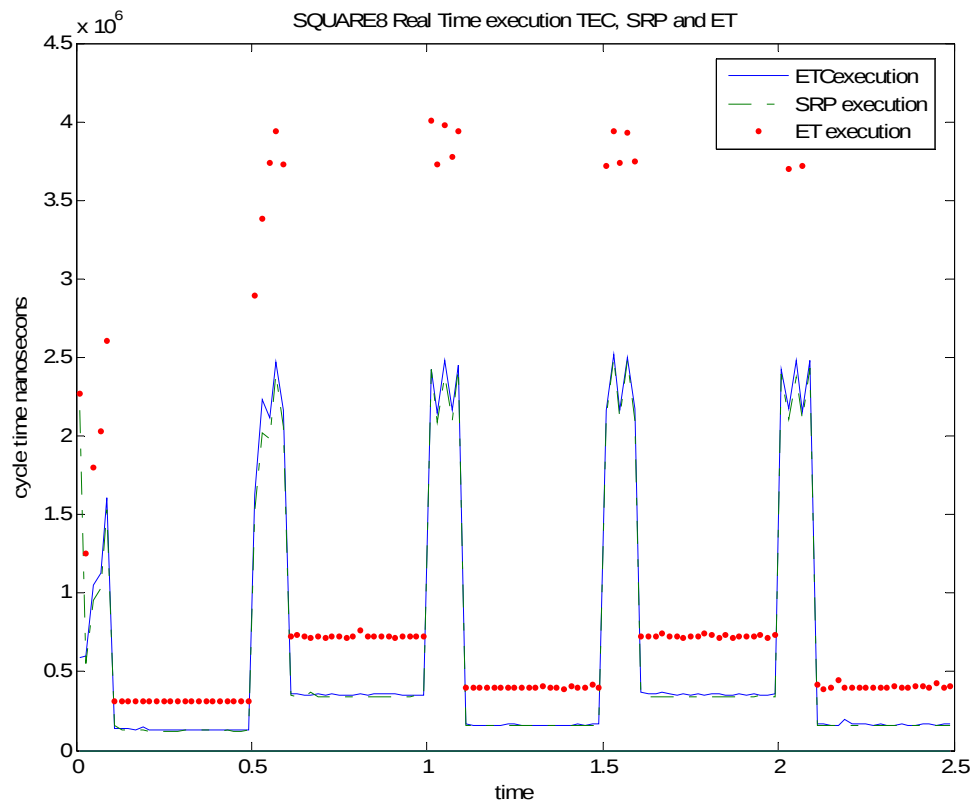


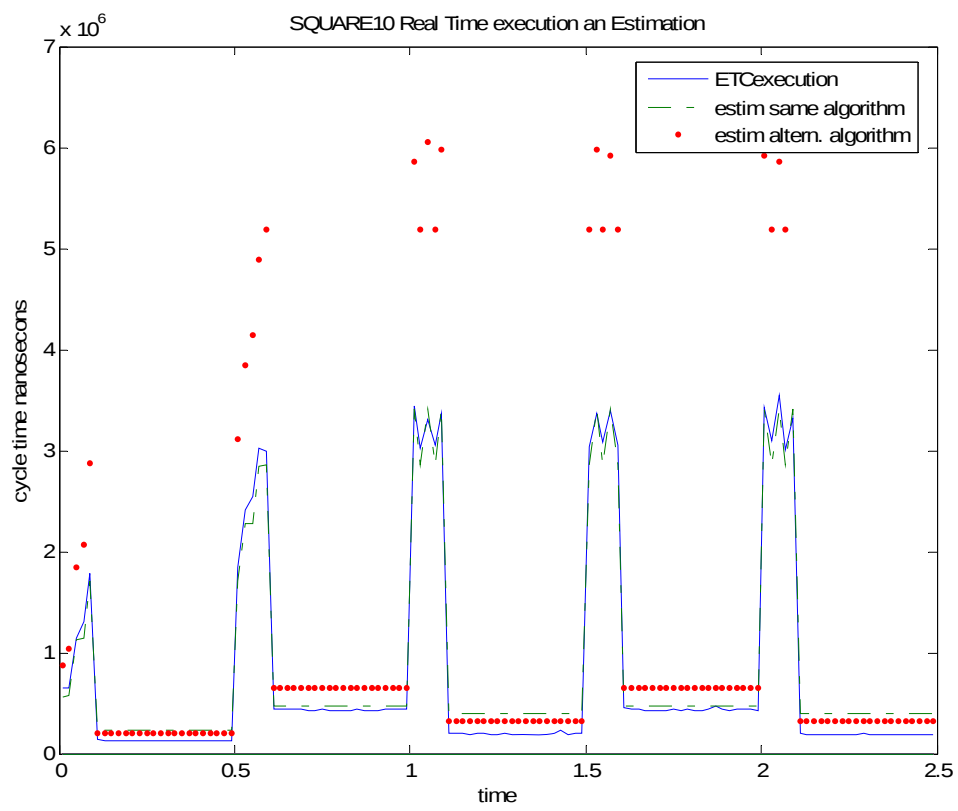
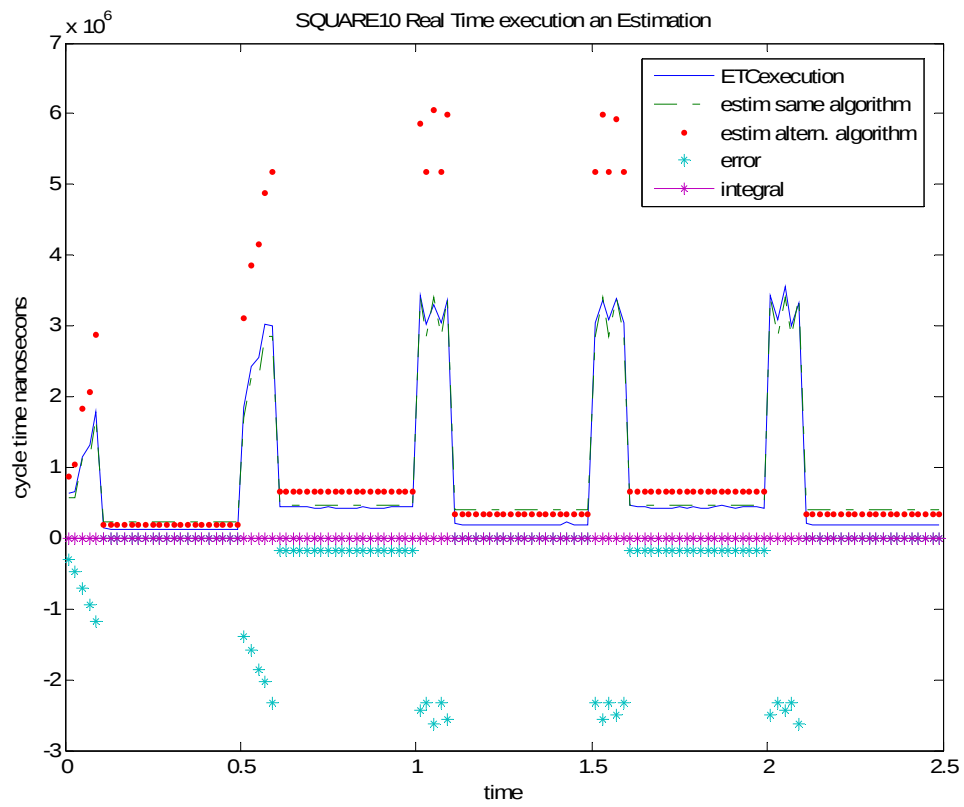


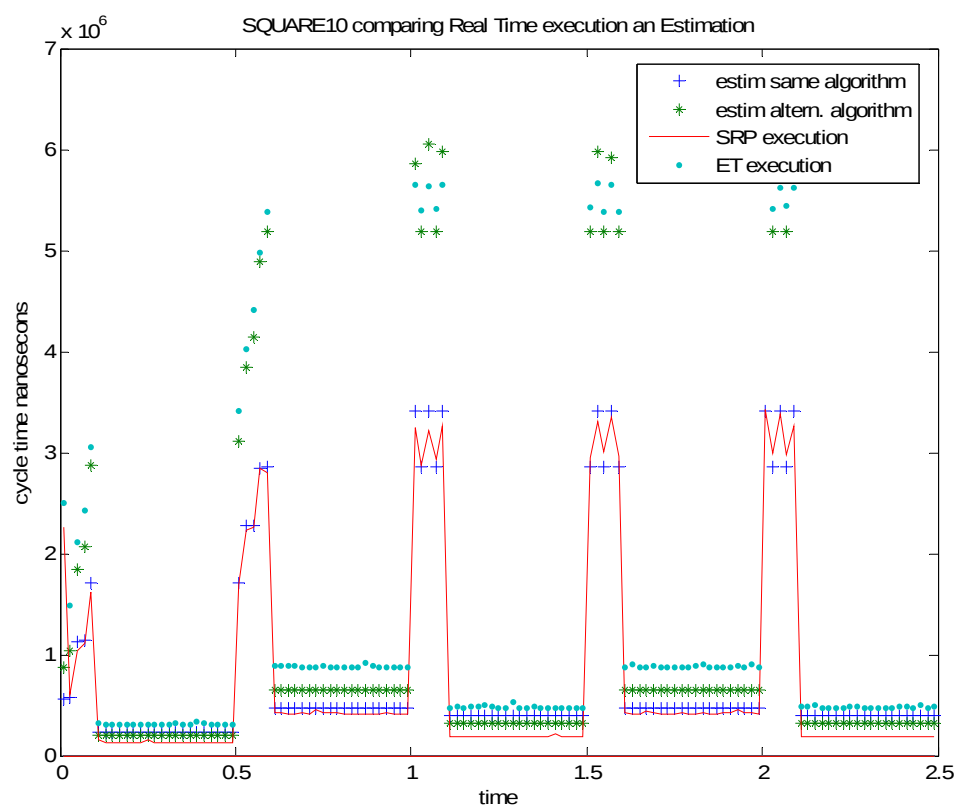
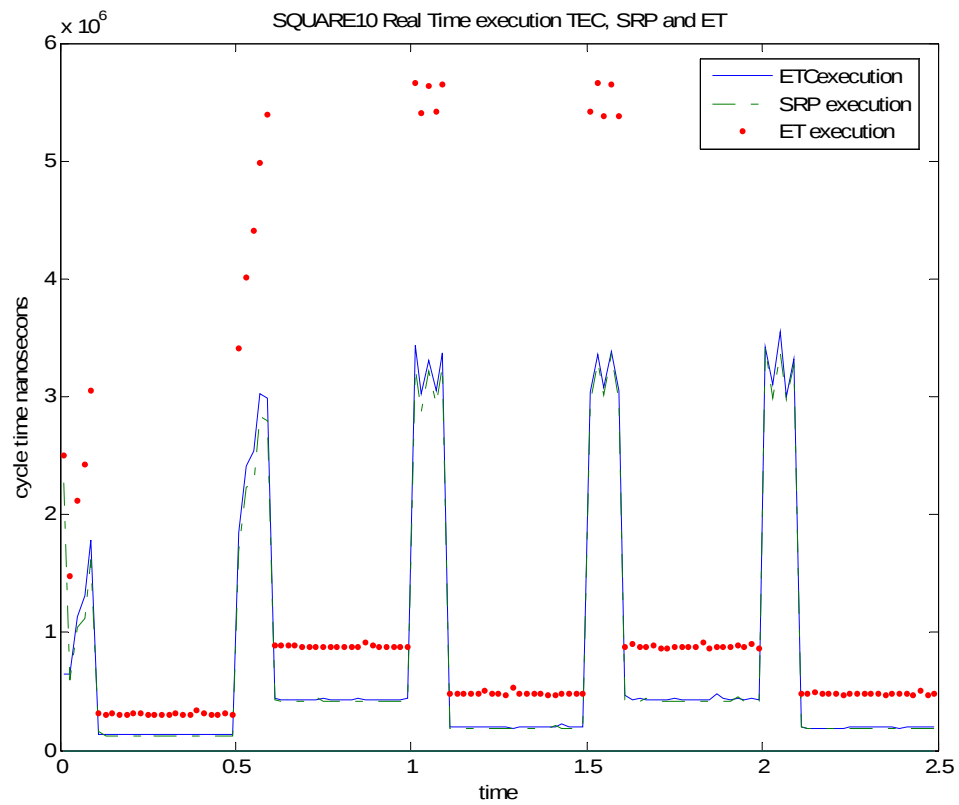


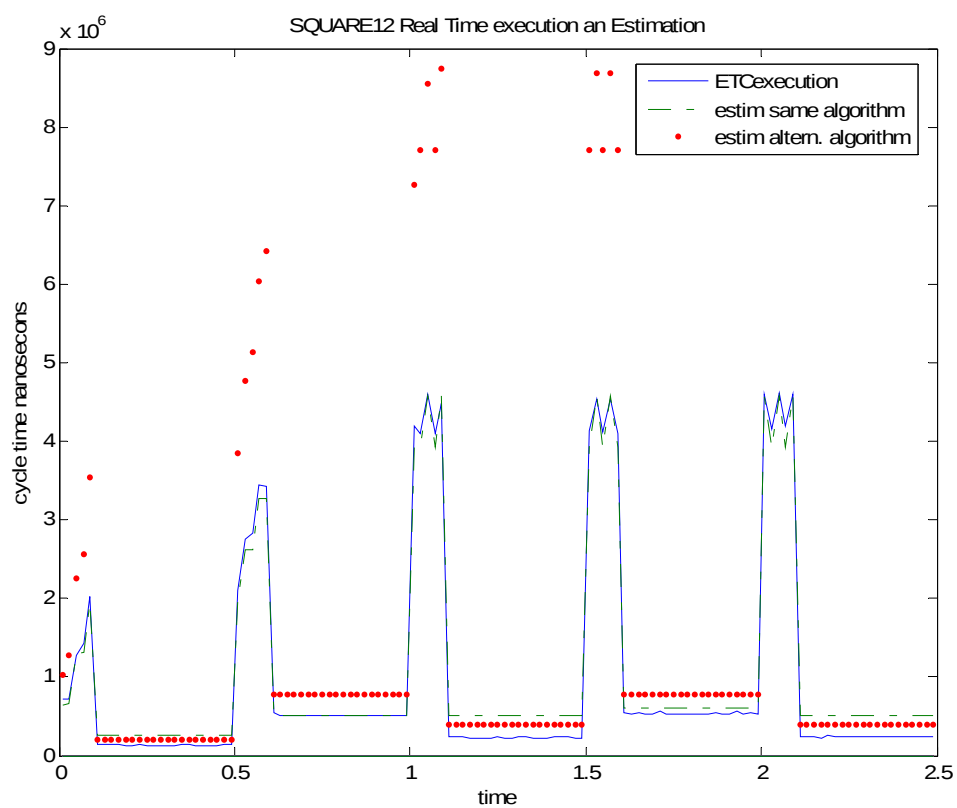
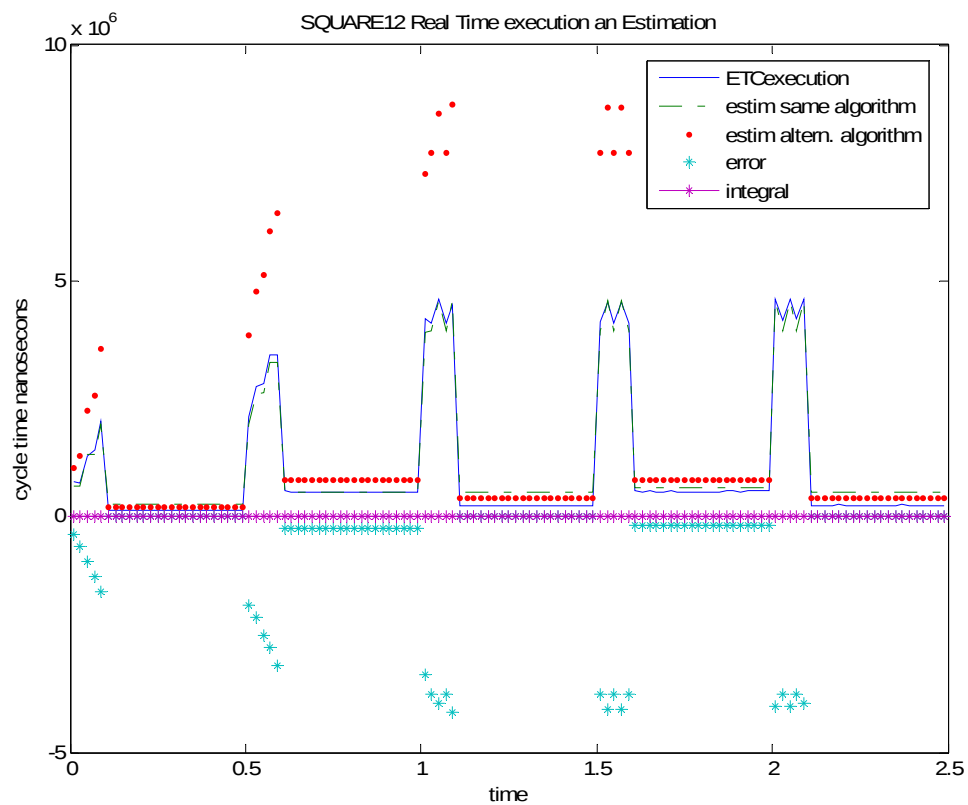


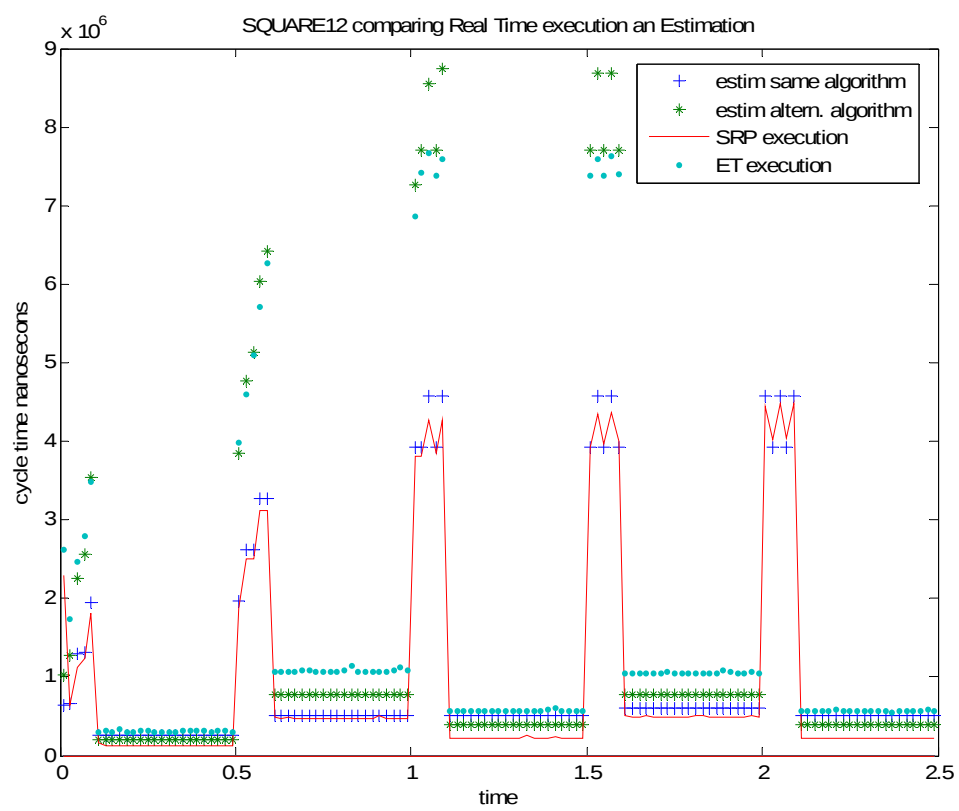
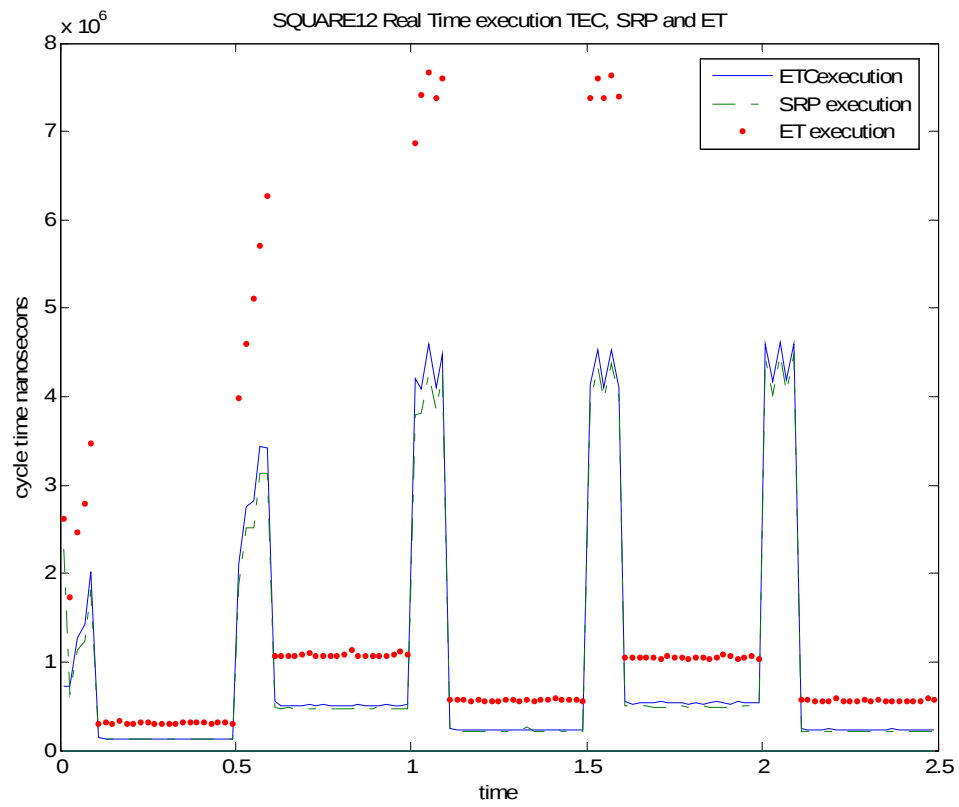


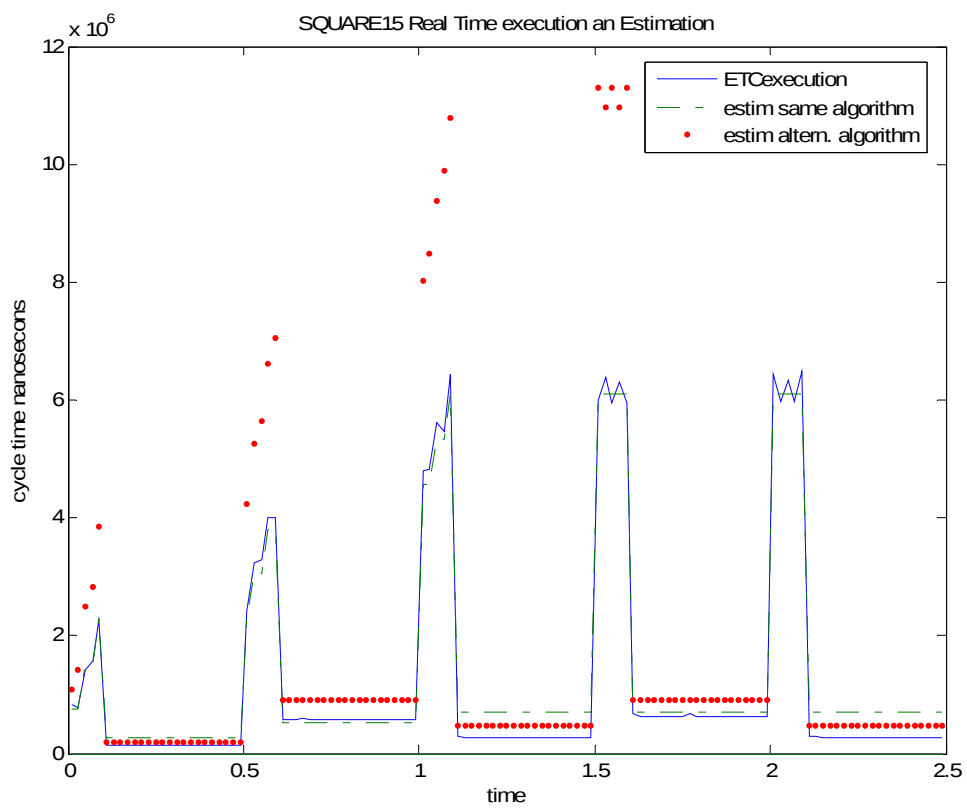
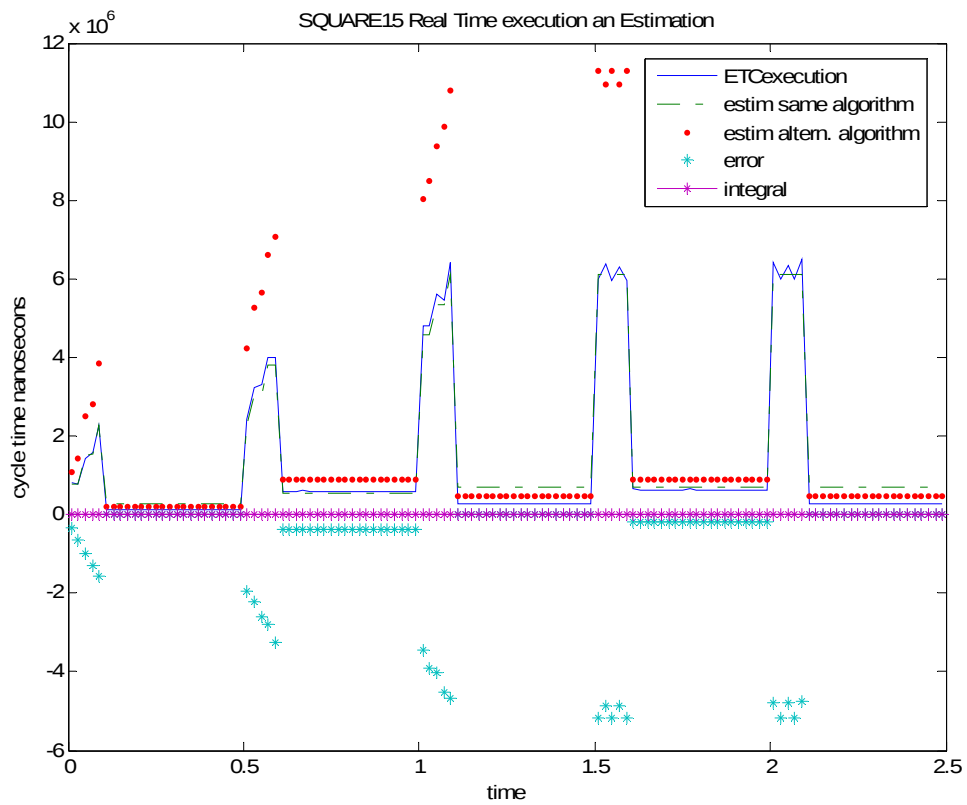


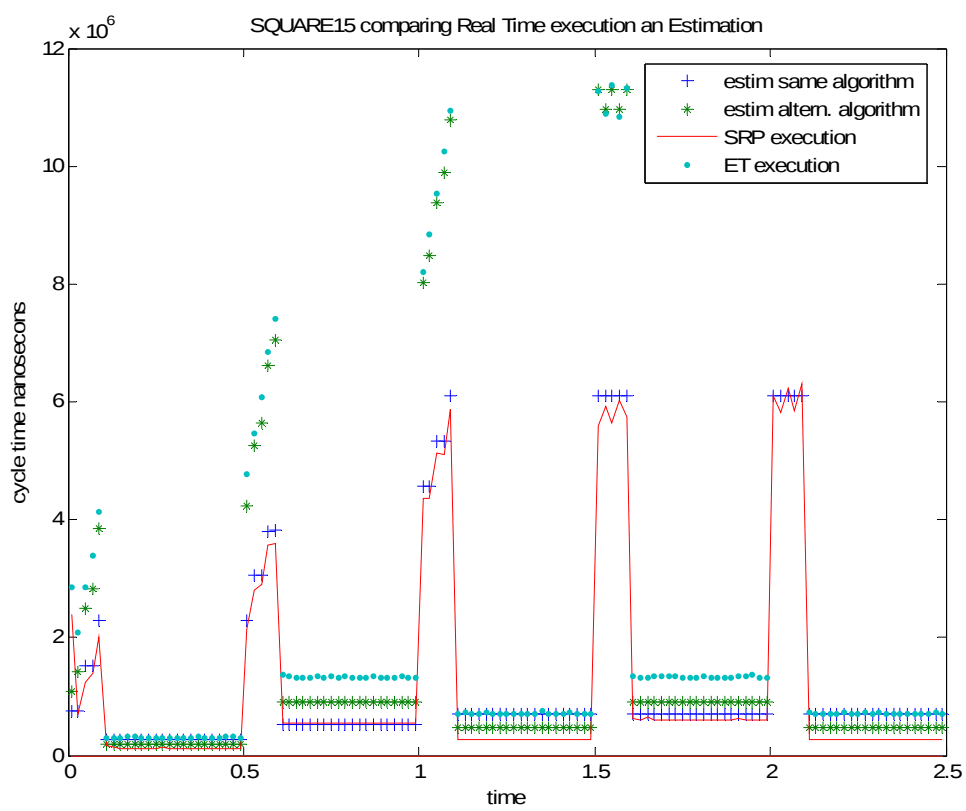
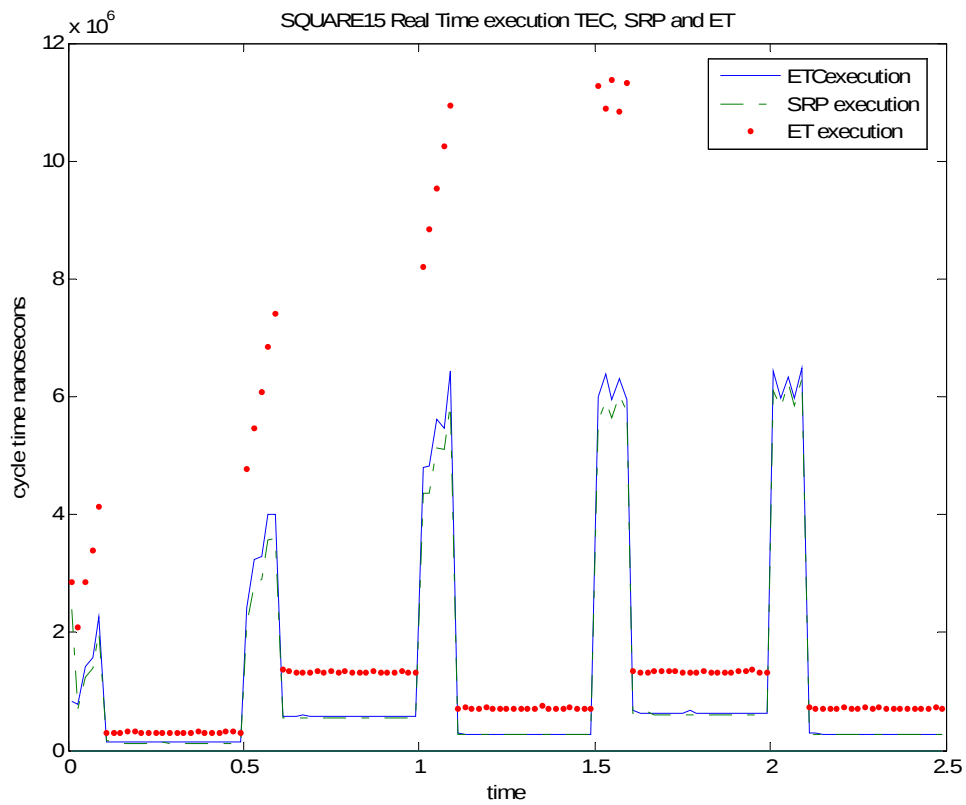












Ensayos 2 con eventos 3 sin eventos

