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Real-time

Total Bandwidth Server

The total bandwidth server has an assigned utilization that is used in the calculation of deadlines as jobs arrive. When the server starts out it has a deadline of zero and budget of zero. Jobs that are ready to execute will trigger the server, resulting in an increase to deadline and the budget. This allows for the job to be considered for execution.

Unlike many other aperiodic server algorithms *total bandwidth server* does not explicitly handle the replenishment and the tracking of the budget. Instead, TBS sets the execution time of the server, e_s, to the execution time of the job, e_s, that is ready to execute $e_s = e_j$. Note that the server's execution time is exactly enough to service e_j and only e_j. When a new job is ready to execute we do the aforementioned replenishment, but we need to make sure that the server does not hog the CPU if many jobs arrive in a short time. The deadline is used to restrict or charge the server.

 When TBS is scheduled using EDF the rate at which a new job can execute is controlled (See figure 1.1) (remember that a new job that is ready to execute is the only thing that can trigger a budget replenishment.) The deadline of the server is updated when a new job is ready to execute, after the server budget is updated $e_s = e_j$, using the equation $\max\{d_s, t\} + e_s/U_s$. Where d_s is the current deadline of the server; t is the current time; e_s is the execution time of the server; U_s is the utilization of the server. If $\max\{d_s, t\}$ chooses t then that means that d_s is in the past and no knew job ran to update the deadline so the server idled past the deadline (there is also the possibility that the deadline was missed, we won't consider that).
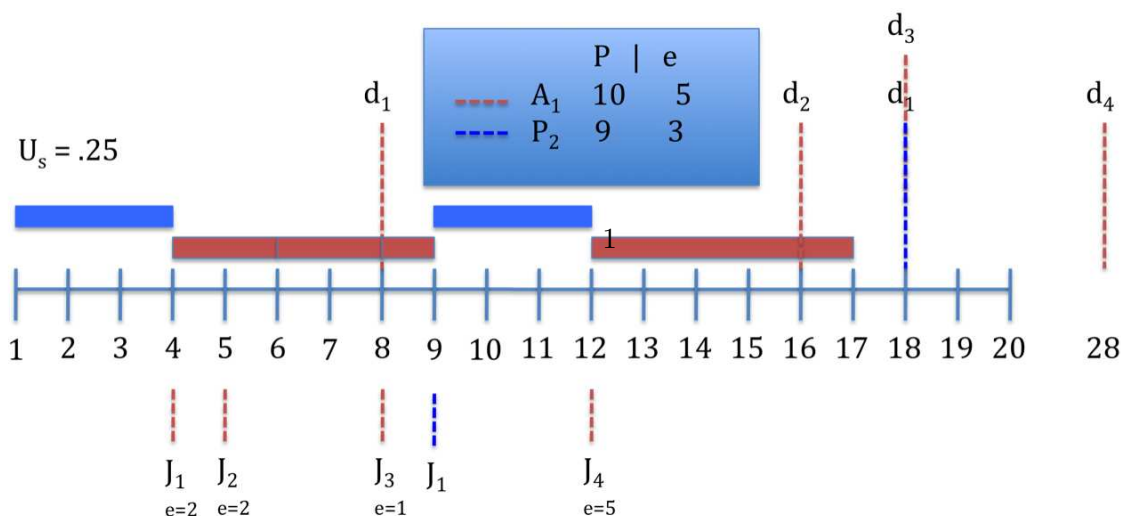
The system above contains a TBS server A1, and a periodic Task P_2.
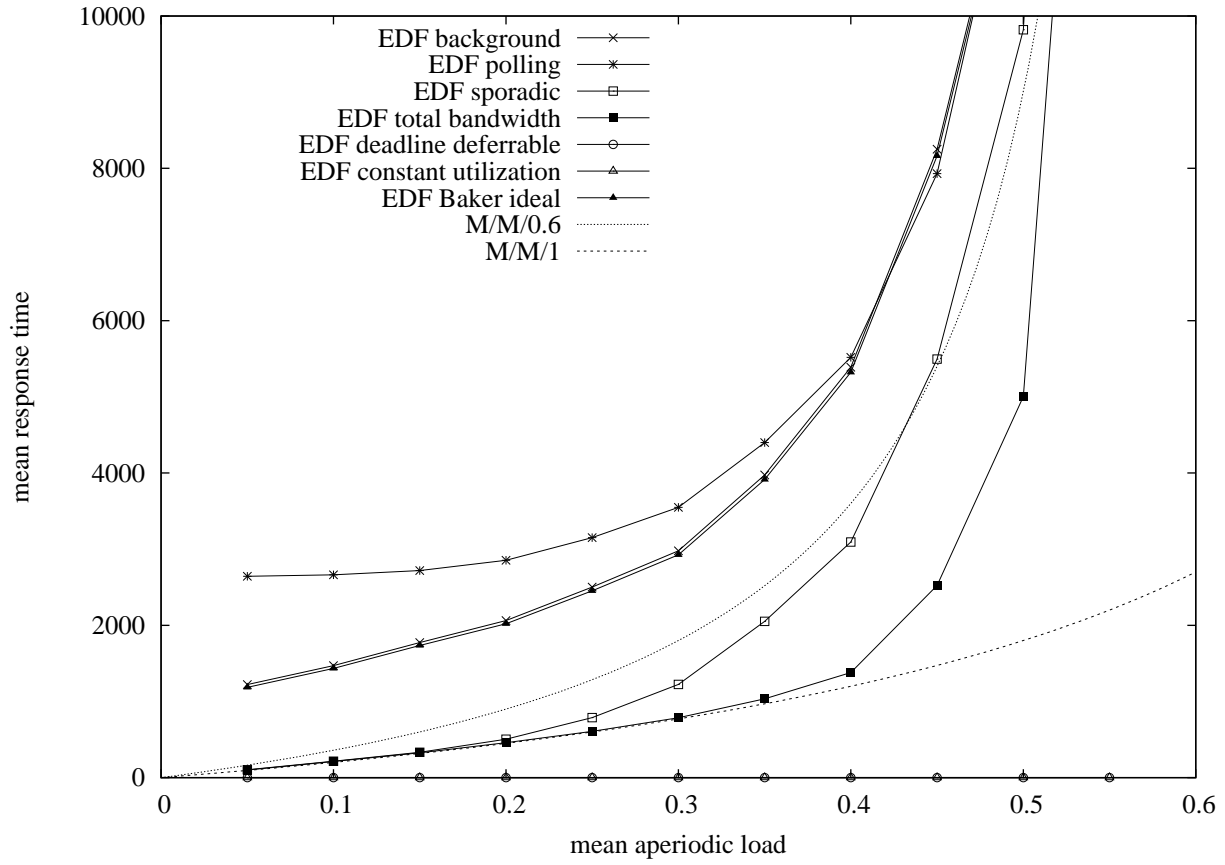
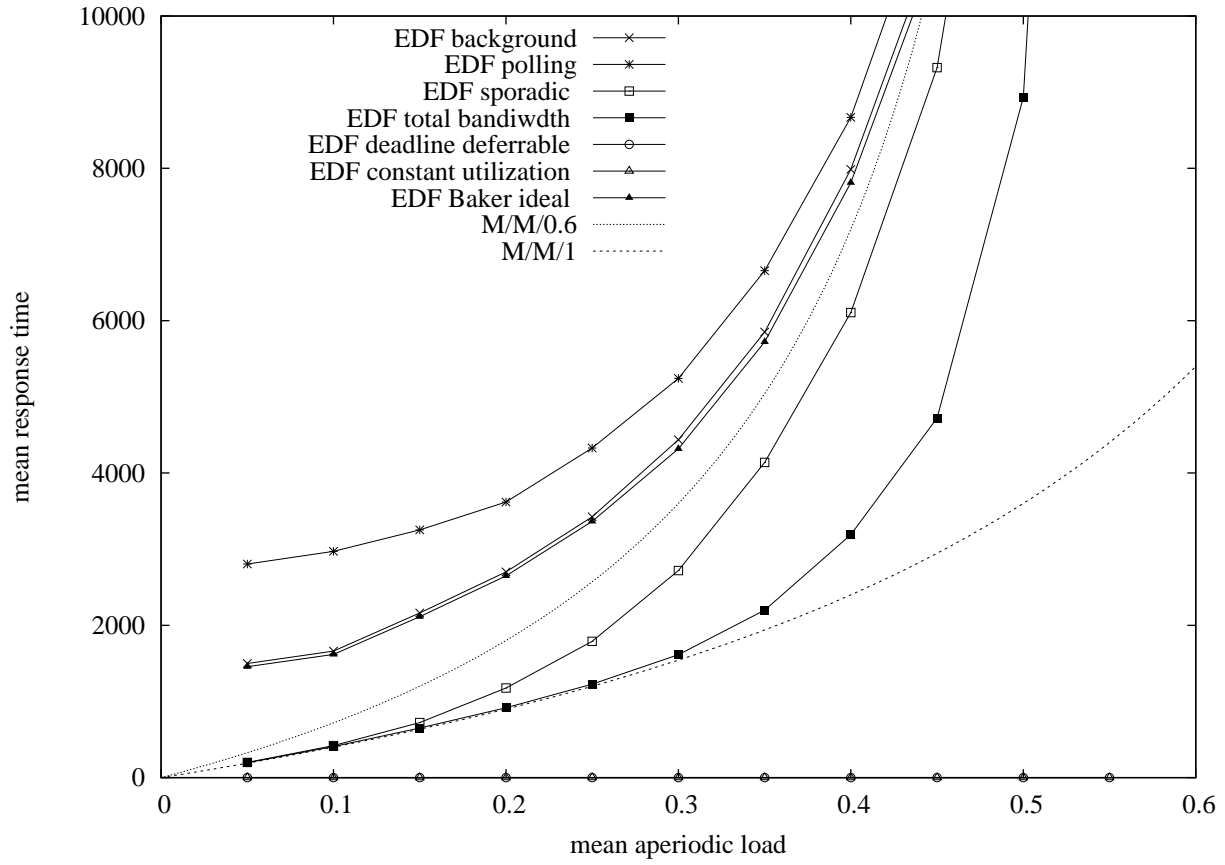Figure 1: Mean aperiodic interarrival time 5400, 40% Periodic Load

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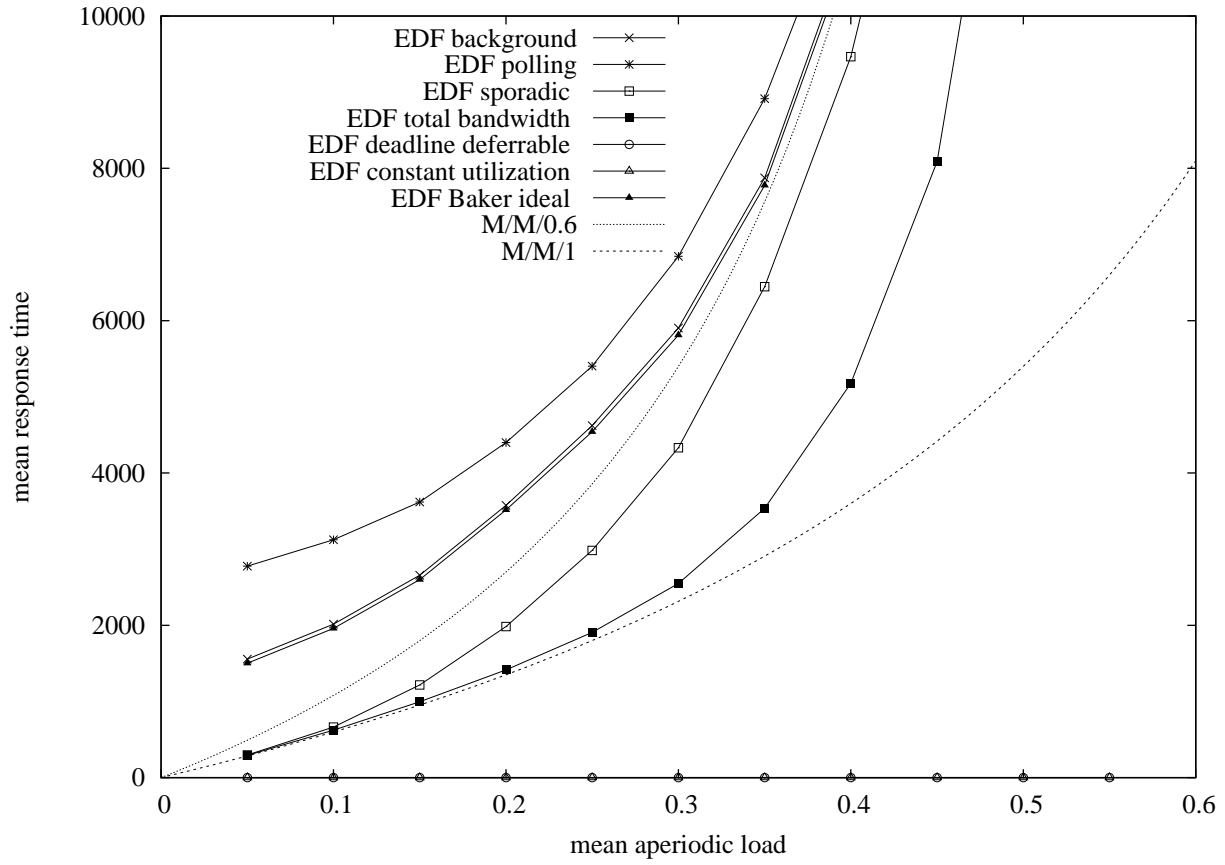Figure 2: Mean aperiodic interarrival time 3600, 40% Periodic Load

Figure 3: Mean aperiodic interarrival time 1800, 40% Periodic Load
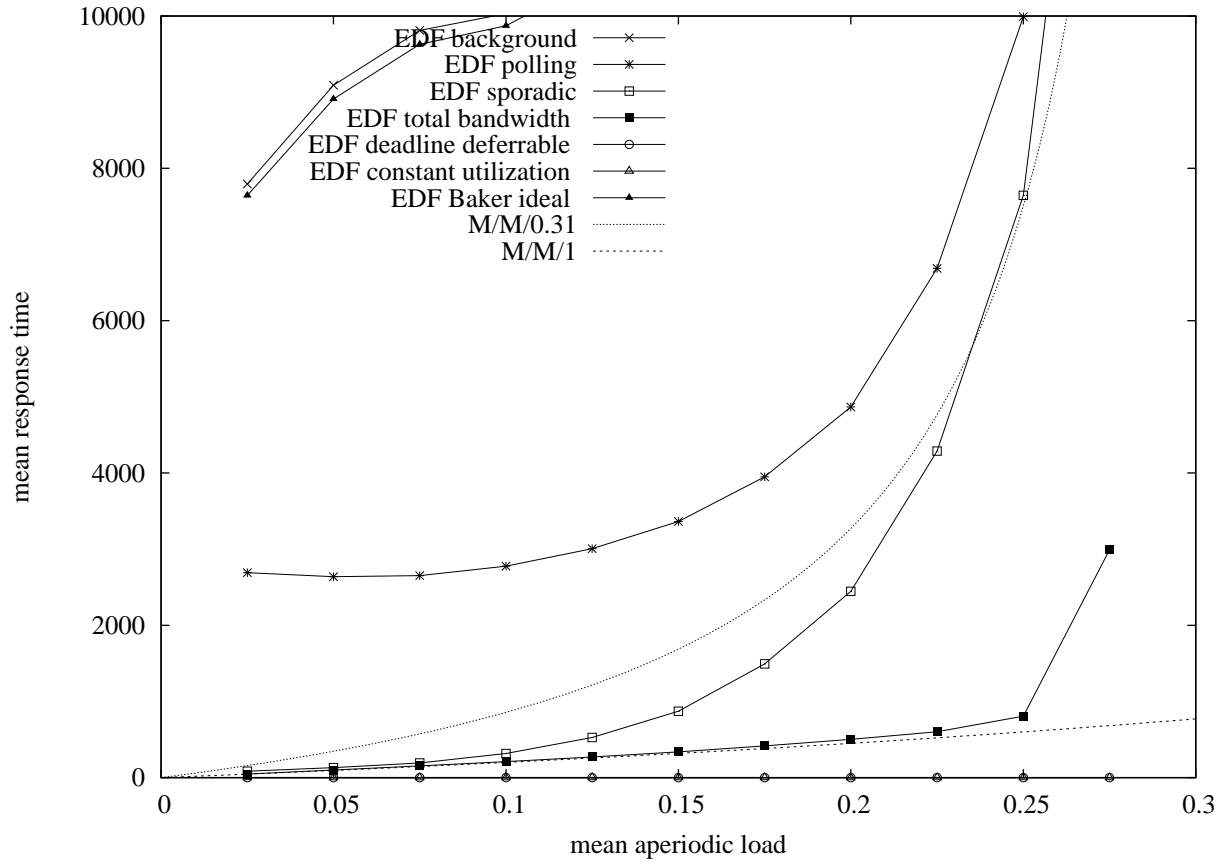
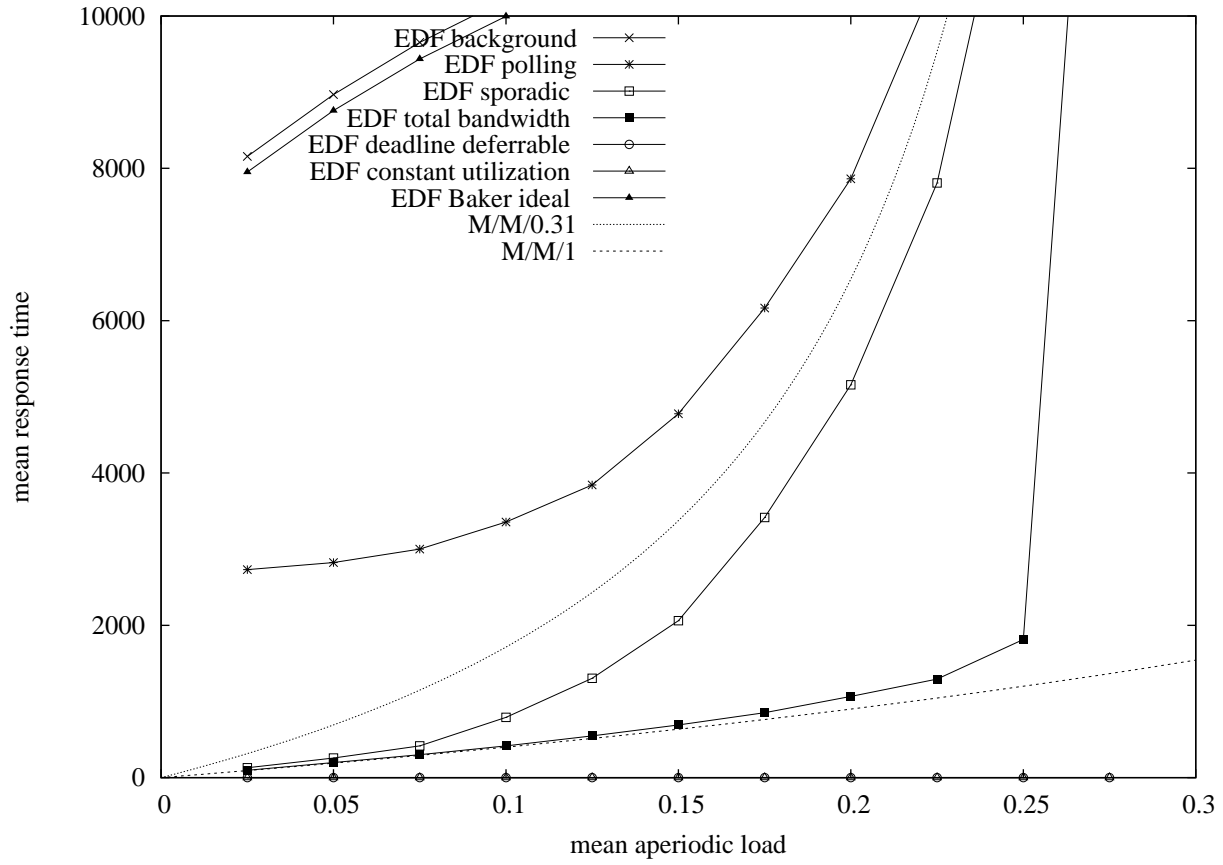Figure 4: Mean aperiodic interarrival time 5400, 69% Periodic Load

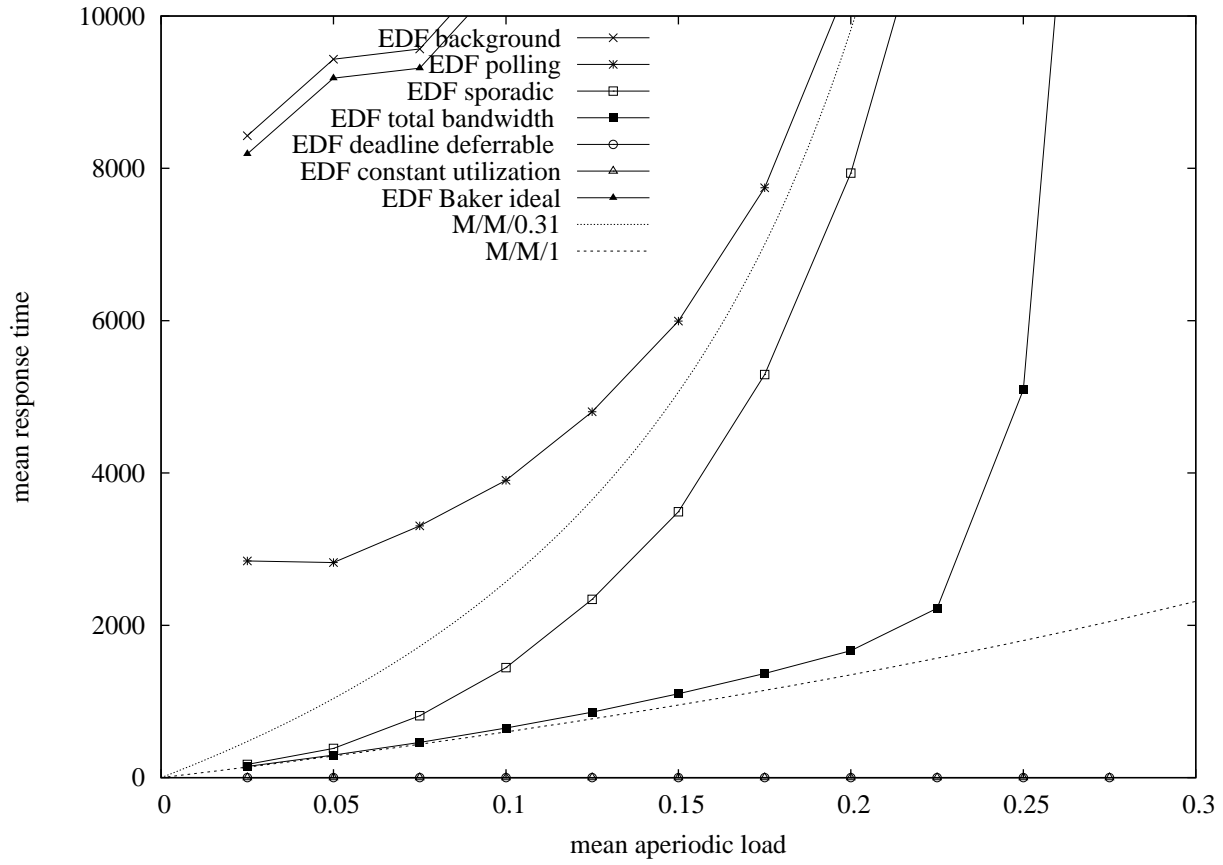Figure 5: Mean aperiodic interarrival time 3600, 69% Periodic Load

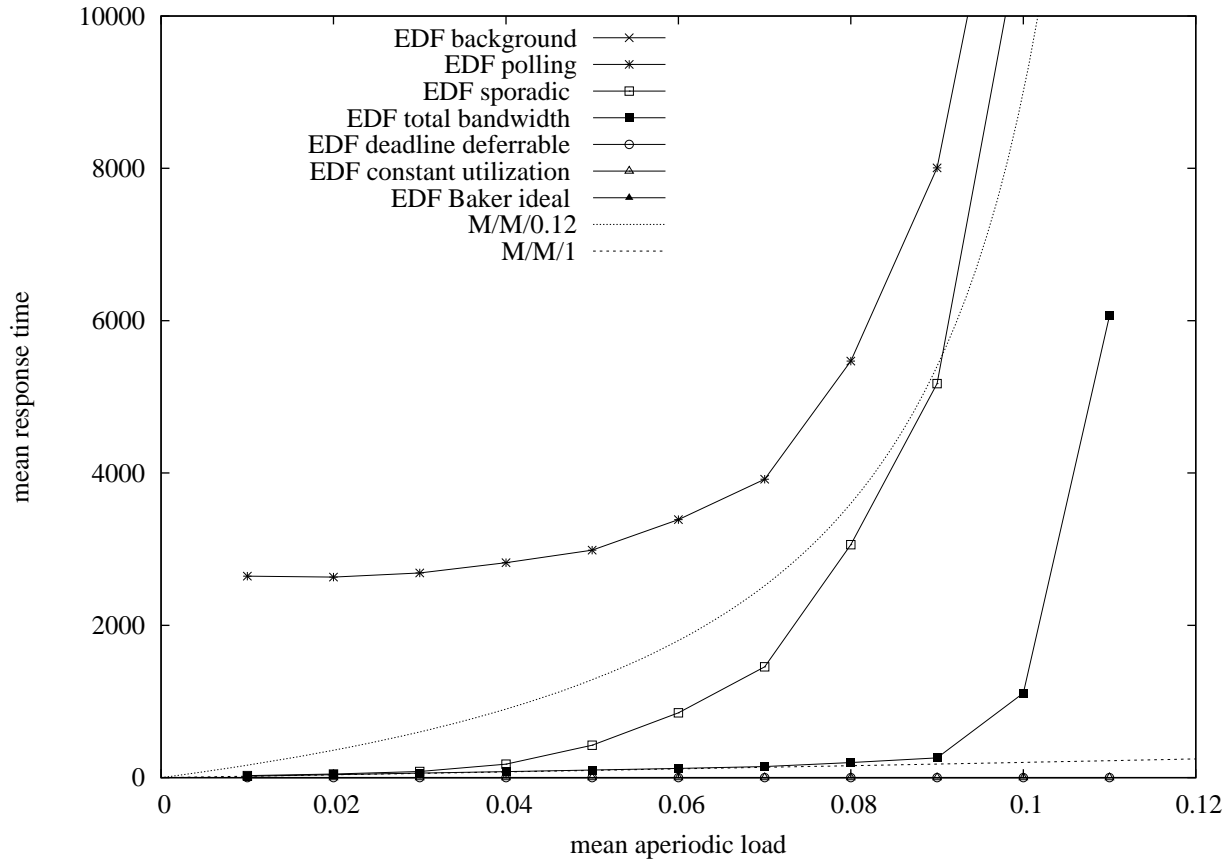Figure 6: Mean aperiodic interarrival time 1800, 69% Periodic Load

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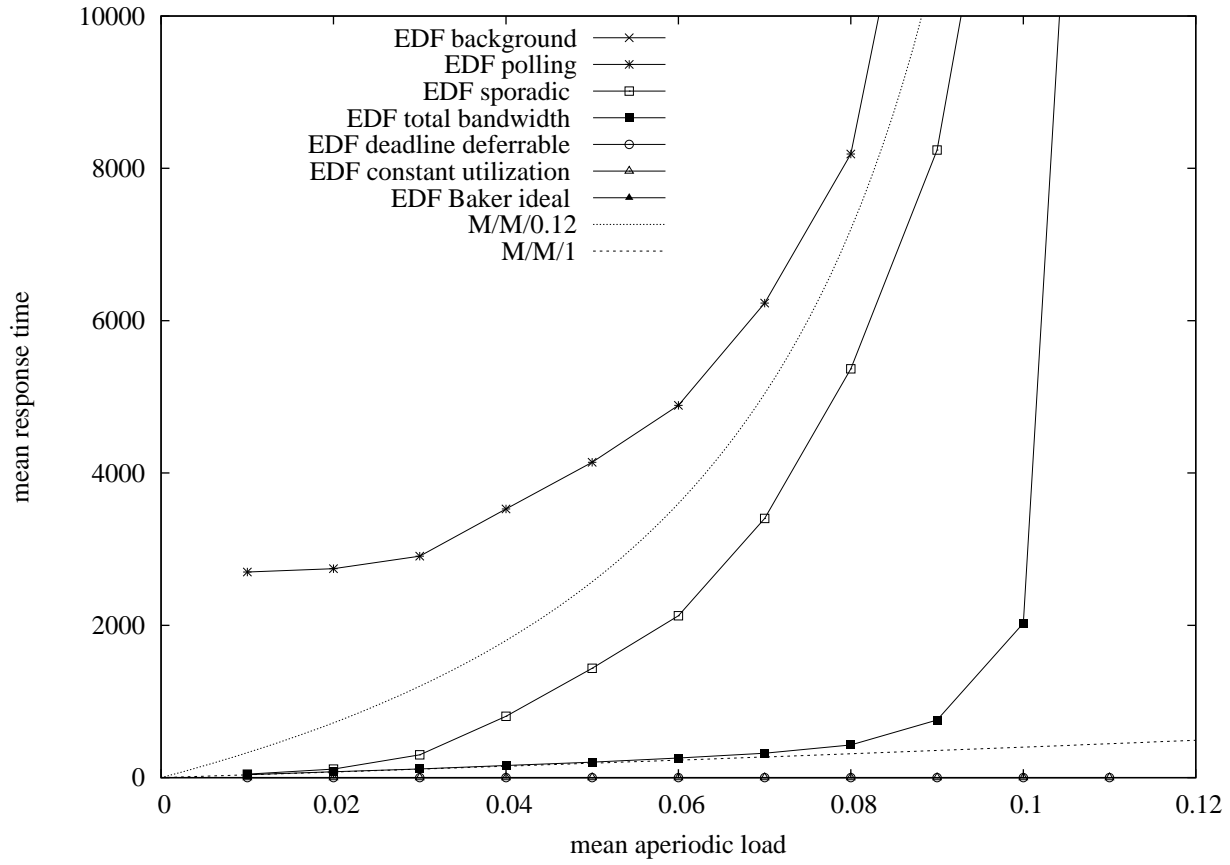Figure 7: Mean aperiodic interarrival time 5400, 88% Periodic Load

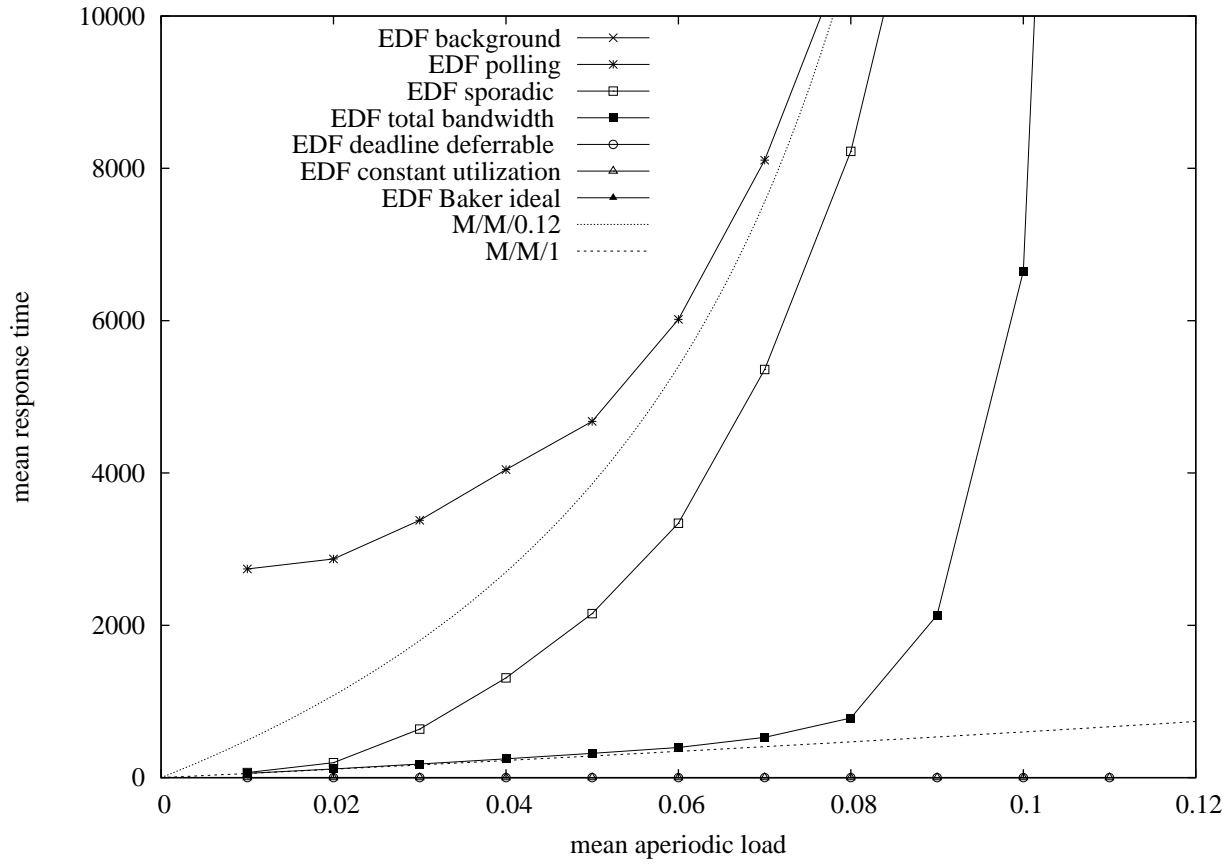Figure 8: Mean aperiodic interarrival time 3600, 88% Periodic Load

Figure 9: Mean aperiodic interarrival time 1800, 88% Periodic Load