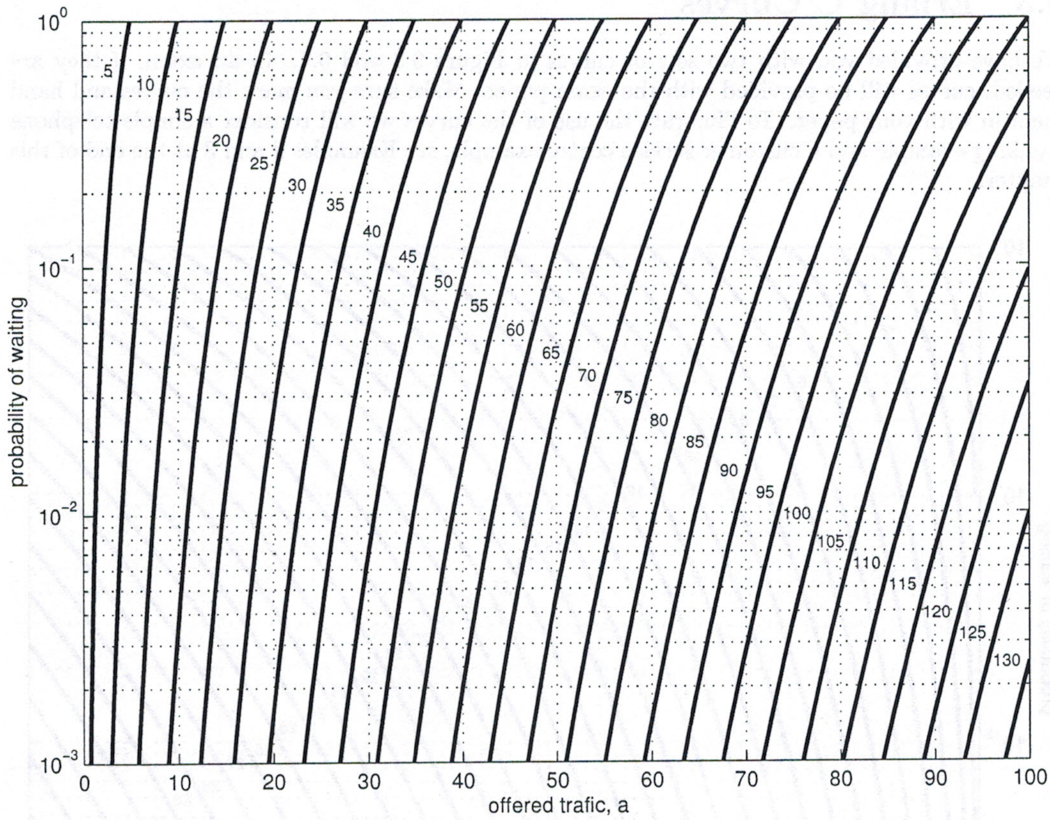

Figure 9.4: Erlang C curves for offered traffic between 0 and 100.

(see Example 4) . Note that this is the average queueing time for all customers (whether they queued or not). It might be more informative to compute the average queueing time for those who actually queue. This can be easily done using the fact that the average queueing time for those who don't queue is zero. The average queueing time can be decomposed as

$$\bar{W} = C(m,a)\,\bar{W}_Q + (1 - C(m,a))\,\bar{W}_{\sim Q},$$

where $\bar{W}_Q$ is the average queueing time for those who do queue and $\bar{W}_{\sim Q}$ is the average queueing time for those who don't queue. Since $\bar{W}_{\sim Q} = 0$ the second term in this sum is zero, so we can rewrite in terms of $\bar{W}_Q$ as

$$\bar{W}_Q = \frac{\bar{W}}{C(m,a)} = \frac{1}{m\mu(1-\rho)} = \frac{1}{\mu(m-a)}.$$

Note that the result shows that the average queueing time for those who do queue is *independent* of the probability of queueing.

Examples

1. **Erlang Delay Stationary Distribution.** Derive the stationary distribution for the Erlang delay system.