The fading-memory recursive filter, defined by Eqs. (12) and (20), can be applied to launch test results to estimate failure probability. For this application the values to be filtered are the test outcomes, with 0 representing a successful launch, and 1 representing a failure or anomalous behavior. Given a series of outcomes, the filtered result after each launch in the series represents the estimate of failure probability at that point. Filtered results for two filter-control constants are shown in Table 37 for a hypothetical series of ten launches for which all but the second and fourth flights were successful.

Table 37. Filter Application for Failure Probability

		F = 0.98		F = 0.90	
Index	Outcome	Filter factor, a_n	Fail. Prob.	Filter factor, a_n	Fail. Prob.
1	0	1.0000	0.0	1.0000	0.0
2	1	0.5051	0.5051	0.5263	0.5263
3	0	0.3401	0.3333	0.3690	0.3321
4	1	0.2576	0.5051	0.2908	0.5263
5	0	0.2082	0.3999	0.2442	0.3978
6	0	0.1752	0.3299	0.2132	0.3129
7	0	0.1517	0.2798	0.1917	0.2529
8	0	0.1340	0.2423	0.1756	0.2085
9	0	0.1203	0.2132	0.1632	0.1745
10	0	0.1093	0.1899	0.1535	0.1477

In this example, estimated failure probabilities are shown for two values of the filter constant that force the filter to fade at two different rates. After ten launches the estimated failure probability using F = 0.98 is 0.1899. For the faster fading-memory filter (F = 0.90), the result is 0.1477. Both estimates are less than that obtained by equal weighting, since the two failures occurred early in the sequence. Note that after four launches (2 successes and 2 failures) both filtered estimates exceed 0.5, since one of the two failures occurred during the fourth flight.

If the 1's and 0's used in the example to represent failures and successes were reversed, the same filter would provide estimates of probability of success.