where p is the probability of occurrence of the GFDF mode, T_B is the stage burn time, and $\dot{R}$ is the rate of change of the impact range. The function cannot be applied early in flight before programming when $\dot{R}$ is essentially zero. The range portion of the Mode-5 impact-density function used in DAMP reduces to essentially the same form. If Eq. (3) is integrated between the limits of zero and π, the conditional Mode-5 density function reduces to

$$f(R) = \frac{1}{(T_B - T_P)\dot{R}} \tag{9}$$

where T_P is the programming time, and T_B and $\dot{R}$ are as previously defined. To obtain absolute values, f(R) must of course be multiplied by the probability of occurrence of a Mode-5 failure response.

Although the GFDF density function may be a suitable model for random-attitude failures occurring at or a few seconds after programming, the performance histories in Appendix D indicate that such failures are no more likely to occur at programming than at any other time. Thus, there appears to be no need for including a GFDF mode per se in the risk calculations, since all random-attitude failures are accounted for by the Mode-5 density function. However, if for some obscure reason inclusion of a GFDF response mode is desired, two approaches are possible: (1) run the GFDF mode separately in DAMP (by using Mode-5 with A = 1) while zeroing out all other response modes; (2) modify DAMP to handle two separate Mode-5 density functions, each with its own values of A and B. Obviously approach (2) is much more involved and time consuming to implement.

Although it may not be obvious, the probability of impact in any annular range interval obtained by integrating the Mode-5 density function between the interval boundaries is independent of the values assigned to A and B. If Eq. (3) is integrated between the angle limits of zero and π (and only for these limits), the A's and B's cancel leaving the probability of impact between R_1 and R_2 as a function of impact range alone. With a change of variable, the probability of impacting between R_1 and R_2 becomes a simple function of time (see pages 84 and 85 of Ref. [1] for details).