



**Figure A2B**  
**Critically and Overdamped Step Response**

#### 5. GROUND EFFECT

a. For an FFS to be used for take-off and landing (not applicable to Level A simulators in that the landing maneuver may not be credited in a Level A simulator) it should reproduce the aerodynamic changes that occur in ground effect. The parameters chosen for FFS validation should indicate these changes.

(1) A dedicated test should be provided that will validate the aerodynamic ground effect characteristics.

(2) The organization performing the flight tests may select appropriate test methods and procedures to validate ground effect. However, the flight tests should be performed with enough duration near the ground to sufficiently validate the ground-effect model.

b. The NSPM will consider the merits of testing methods based on reliability and consistency. Acceptable methods of validating ground effect are described below. If other methods are proposed, rationale should be provided to conclude that the tests performed validate the ground-effect model. A sponsor using the methods described below

to comply with the QPS requirements should perform the tests as follows:

(1) Level fly-bys. The level fly-bys should be conducted at a minimum of three altitudes within the ground effect, including one at no more than 10% of the wingspan above the ground, one each at approximately 30% and 50% of the wingspan where height refers to main gear tire above the ground. In addition, one level-flight trim condition should be conducted out of ground effect (e.g., at 150% of wingspan).

(2) Shallow approach landing. The shallow approach landing should be performed at a glide slope of approximately one degree with negligible pilot activity until flare.

c. The lateral-directional characteristics are also altered by ground effect. For example, because of changes in lift, roll damping is affected. The change in roll damping will affect other dynamic modes usually evaluated for FFS validation. In fact, Dutch roll dynamics, spiral stability, and roll-rate for a given lateral control input are altered by ground effect. Steady heading sideslips will also be affected. These effects should be accounted for in the FFS modeling. Several tests such as crosswind landing, one engine