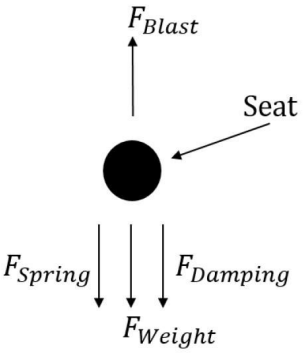
The Scenario

Simplify

The Scenario Simplified

Model

The Free Body Diagram



$$mx'' = \sum Forces$$

Variables and Parameters

$x \equiv Verticle\ displacement\ of\ the\ seat$
$t \equiv Time$
$m \equiv Mass$
$g \equiv Gravity$
$\gamma \equiv Damping\ Constant$
$k \equiv Spring\ Constant$
$H \equiv Time\ the\ Blast\ Ends$

The Model

$$mx'' = F_{Blast} - F_{Spring} - F_{Weight} - F_{Damping}$$

$$mx'' = F_{Blast} - k(x + L) - mg - \gamma x'$$

$$mx'' + \gamma x' + kx = F_{Blast}$$

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2 Versions of a Model:

$$mx'' + \gamma x' + kx = Ae^{-bt}$$

Or

$$mx'' + \gamma x' + kx = D \qquad t < H$$

$$mx'' + \gamma x' + kx = 0 \qquad t \geq H$$