

Inertia cross-coupling during a rapid rolling manoeuvre. Estimation of critical roll rate

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INERTIA CROSS-COUPPLING DURING A RAPID ROLLING MANOEUVRE. ESTIMATION OF CRITICAL ROLL RATE

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1. NOTATION

a	$\frac{1}{2} \left(\frac{\omega_J}{\omega_K} + \frac{\omega_K}{\omega_J} \right) - d$
c	$\frac{p_0}{(\omega_J \omega_K)^{1/2}}$
d	damping parameter $= \frac{1}{2} \left(\frac{J_1}{b_z} \right) \left(\frac{K_1}{-b_y} \right) / \omega_J \omega_K$
J_0	$-u_e n_v^* + y_v n_r^*$
J_1	$y_v + n_r^*$
K_0	$u_e m_w + m_q z_w$
K_1	$m_q + m_{\dot{w}} + z_w$
n_r^*	“effective” yaw damping $= n_r - l_r \frac{n_{\xi}}{l_{\xi}}$
$-n_v^*$	“effective” yaw stiffness $= - \left(n_v - l_v \frac{n_{\xi}}{l_{\xi}} \right)$
p_0	assumed constant roll rate
ω_J	yawing frequency parameter $= \left(\frac{J_0}{b_z} \right)^{1/2}$
ω_K	pitching frequency parameter $= \left(\frac{K_0}{-b_y} \right)^{1/2}$

For other notation see Item No. 67002^[1].

2. NOTES

It has been shown in Item No. 67006^[2] that linearisation of the equations of motion may be achieved by the assumption of a constant roll rate. This Data Item considers the results of that assumption in more detail and presents the significant part of the stability boundary obtained by means of an approximation to the stability criterion.

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