Course: Introduction to Experiments in Flight

Assignment 2

Solution

<table>
<thead>
<tr>
<th>S.No</th>
<th>Inclinometer readings (deg)</th>
<th>Voltage (V)</th>
<th>Deflection of Control Surface (deg)</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>-16.779</td>
<td>3.676</td>
<td>-13.4</td>
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<td>2</td>
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<td>3.589</td>
<td>-11.6</td>
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<td>3</td>
<td>-10.418</td>
<td>3.106</td>
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<td>4</td>
<td>-9.097</td>
<td>2.961</td>
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<td>5</td>
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<td>6</td>
<td>-4.238</td>
<td>2.672</td>
<td>-0.9</td>
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<td>-3.382</td>
<td>2.553</td>
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<td>2.389</td>
<td>3.4</td>
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<tr>
<td>9</td>
<td>0.132</td>
<td>2.290</td>
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<tr>
<td>11</td>
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<td>2.019</td>
<td>7.8</td>
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</table>

1. What is the can be the reference point (no deflection of control surface) if while analysing data of FDR, with voltage of 2.5 V to elevator the aircraft had pitch up tendency, and with 2.6 V to elevator the aircraft had pitch down tendency. (The aircraft is level when elevator deflection is zero).

Solution:

Since with 2.5 V to elevator the aircraft has pitch up tendency and with 2.6 V to elevator, the aircraft has pitch down tendency. Therefore, the reference point or the elevator with zero deflection has to be between 2.5 V to 2.6 V.

Based on the data given 2.553 V can be reference point (or inclinometer reading -3.382 deg).

Ans: B
2. Plot graph between Voltage vs Deflection of control surface, and using curve fitting tool, equation of line is

\[ Y = -0.0792x + 2.59 \] or \[ V = -0.078\delta + 2.59 \]  

Ans: C

3. Voltage 5 \textit{deg} Up from reference point

\[ V = -0.078 \times 5 + 2.59 \]

\[ V = 2.2\ V \]  

Ans: C

4. Voltage 15 \textit{deg} down from reference point

\[ V = -0.078 \times -15 + 2.59 \]

\[ V = 3.76 \]  

Ans: B

5. Deflection of elevator from reference point corresponding 4.5 V

\[ 4.5 = -0.078 \times \delta + 2.59 \]

\[ \delta = (4.5 - 2.59)/(-0.078) \]

\[ \delta = -24.48 \textit{deg} \]  

Ans: D