

Since by induction hypothesis,

$$\langle e_i, f_k \circ h_{k+1}(e_j) \rangle = 0$$

for all  $i, j$ ,  $1 \leq i \leq k+1$ ,  $k+2 \leq j \leq n$ , and since  $g_{k+1}(e_i) = e_i$  for all  $i$ ,  $1 \leq i \leq k+1$ , conclude that

$$\langle e_i, g_{k+1} \circ f_k \circ h_{k+1}(e_j) \rangle = 0$$

for all  $i, j$ ,  $1 \leq i \leq k+1$ ,  $k+2 \leq j \leq n$ . Finish the proof.