the linearization during the lecture (time: 1:07:12) missed a minus sign.
here the correction:

- given function

$$f(u_0 + \lambda\Delta u) \;=\; q - (1 + u_0 + \Delta u)(2 + u_0 + \Delta u)(u_0 + \Delta u)$$

- linearization from truncated Taylor series expansion about point u_0

$$f(\lambda) \;=\; [f]_{u_0} + \left[\lambda \frac{df}{d\lambda}\right]_{u_0} + \left[\frac{1}{2}\lambda^2 \frac{d^2 f}{d\lambda^2}\right]_{u_0} + \ldots$$

- linearization for λ=1 gives

$$\begin{aligned} f(\lambda) \;=\; f(u_0) + \lambda\, [\; & -\Delta u\,(1 + u_0 + \lambda\,\Delta u)(2 + u_0 + \lambda\,\Delta u) \\ & -\Delta u\,(u_0 + \lambda\,\Delta u)(2 + u_0 + \lambda\,\Delta u) \\ & -\Delta u\,(u_0 + \lambda\,\Delta u)(1 + u_0 + \lambda\,\Delta u)\;] \end{aligned}$$

$$f(\lambda) \;=\; f(u_0) - \Delta u\,(3\,u_0^2 + 6\,u_0 + 2)$$

- solution of the linearized form by setting $f(\lambda) \;=\; 0$
- minus term (tangent stiffness * displacement increment) is pushed to the left
- the results shown during the lecture are correct!!