Problems A1-3: Multi-Bunch Effect and Parameter Optimisation

1) In a linac with a very long bunch train the longrange wakefield of each bunch only acts on the next-to-next bunch with $a_2 = 1$ ($a_i = 0$ for $i \neq 2$).

- Please calculate $A_{k,1}$

Solutions

1) The calculation is performed in the same way as for the wakefield kick on only the next following bunch. We have two trains that do not interact with each other. With $a_2 = 1$, $a_{k\neq 2} = 0$ and the Taylor series for the exponential

$$A = \exp(a) = \sum_{k=0}^{n-1} \frac{a^k}{k!}$$

we find

$$A_{2k,1} = \frac{(ia_2)^k}{k!} \qquad A_{2k+1,1} = 0$$