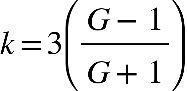
# Calculating digital bell filter coefficients for a specified value

*All calculations performed using https://www.wolframalpha.com/*

Equivalent analogue filter s-plane transfer is:



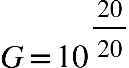
Q – Q factor

– centre frequency ( critical frequency )

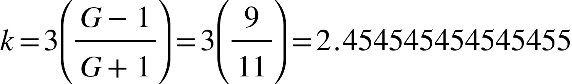
**Let’s assume a gain of 20 dB and 125 Hz as centre frequency.**

To determine the coefficients, we first determine the pre-warped analogue transfer function.

Starting off by converting the gain to linear ratio:

 = 10.

From here,



This means that H(s):

Then, for 20 dB and 125 Hz:

The pre-warped boost frequency is



Where T is the period and is the specified cut-off(critical frequency)

;  s

Then, inserting the values:



The frequency-scaled factor is:



The pre-warped analogue transfer function is:



Applying BZT method:



**For our case, with centre frequency at 125 Hz, gain of 20 dB and Q-factor of 1:**



Using Matlab to compute those coefficients:

Table

Description automatically generatedTable

Description automatically generated

Further calculations ( not sure if those should be included or not )

