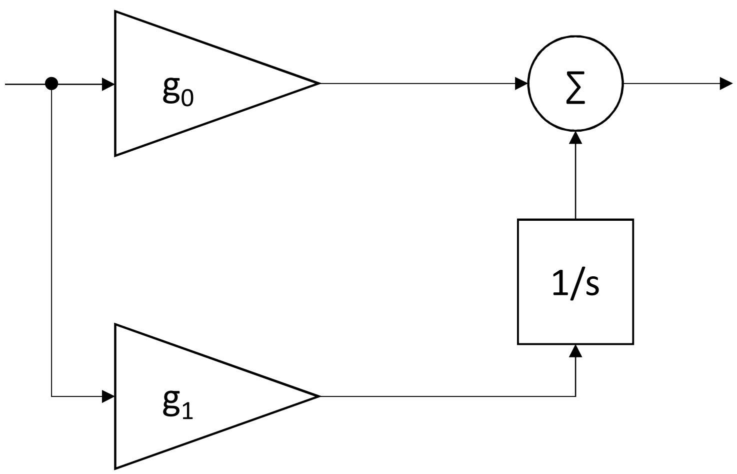

$$H(z) = g_0 + g_1 * \frac{T}{2} * \left(\frac{1+z^{-1}}{1-z^{-1}}\right) = \frac{g_0 + g_1 * \frac{T}{2} + (-g_0 + g_1 * \frac{T}{2}) z^{-1}}{1-z^{-1}}$$

Because z-transfer function can always be represented as the ratio of two polynomials in z, we can write for 1st order filter:

$$H(z) = \frac{b_0 + b_1 z^{-1}}{1+a_1 z^{-1}}$$

This give us following coefficients:

$$b_0 = g_0 + g_1 * \frac{T}{2}$$

$$b_1 = -g_0 + g_1 * \frac{T}{2}$$

$$a_1 = -1$$

$$g_0 = \alpha\omega_0$$
$$g_1 = {\omega_0}^2$$
$$\omega_0 = \frac{4\alpha}{1+\alpha^2} * \text{noise\_bandwidth}$$