Frequency Transformation with Pascal Matrix Equations

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Abstract : Frequency transformation with Pascal matrix equations is a method for transforming an electronic filter (analogue or digital) into another filter. The technique is based on frequency transformation in the s-domain, bilinear z-transform with pre-warping frequency, inverse bilinear transformation and a very useful application of the Pascal’s triangle that simplifies computing and enables calculation by hand when transforming from one filter to another. This paper will introduce two methods to transform a filter into a digital filter: frequency transformation from the s-domain into the z-domain; and frequency transformation in the z-domain. Further, two Pascal matrix equations are derived: an analogue to digital filter Pascal matrix equation and a digital to digital filter Pascal matrix equation. These are used to design a desired digital filter from a given filter.

Keywords : frequency transformation, bilinear z-transformation, pre-warping frequency, digital filters, analog filters, pascal's triangle

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