Choppers to optimise the repetition rate multiplication technique on a direct geometry neutron chopper spectrometer - DTU Orbit (02/12/2018)

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In recent years the use of repetition rate multiplication (RRM) on direct geometry neutron spectrometers has been established and is the common mode of operation on a growing number of instruments. However, the chopper configurations are not ideally optimised for RRM with a resultant 100 fold flux difference across a broad wavelength band. This paper presents chopper configurations that will produce a relative constant (RC) energy resolution and a relative variable (RV) energy resolution for optimised use of RRM. The RC configuration provides an almost uniform ∆E/E for all incident wavelengths and enables an efficient use of time as the entire dynamic range is probed with equivalent statistics, ideal for single shot measurements of transient phenomena. The RV energy configuration provides an almost uniform opening time at the sample for all incident wavelengths with three orders of magnitude in time resolution probed for a single European Spallation Source (ESS) period, which is ideal to probe complex relaxational behaviour. These two chopper configurations have been simulated for the Versatile Optimal Resolution direct geometry spectrometer, VOR, that will be built at ESS.

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