*Problem definition

The second-order moving average (MA2) is a common model used for univariate time series analysis. The observation at time t is given by:

gather eq:ma2 $\mathrm{y}_t = w_t + \theta_1 w_{t-1} + \theta_2 w_{t-2}$

As we can notice, $w_{k,k\in Z} \sim N(0,1)$ represents an independent and identically distributed white noise and θ_1, θ_2 the dependence from the previous observations. The number of consecutive observations T is a hyper-parameter of the model; in our case we will set $T = 100$. Computing the likelihood of the MA2 model is generally difficult, due to the unobserved noise variables w_t, w_{t-1}, w_{t-2}, and it becomes intractable in cases where T is large. On the other hand, generating a MA2 time-series is pretty easy and efficient using a simulator.

At our example, we use the prior as defined by Marin et al. Marin2012 for guaranteeing that the inference problem is identifiable i.e. loosely speaking, the likelihood will have just one mode. The multivariate prior, which is given in the equation eq:ma2$_p rior, follows a triangular shape fig : ma2_1$.

equation eq:ma2$_p riorp() = p(\theta_1)p(\theta_2|\theta_1) = U(\theta_1; -2, 2)U(\theta_2; \theta_1 - 1, \theta_1 + 1)$