Simplified Initialization

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The procedure of initialization usually used in hydrodynamic forecasts apparently is excessively complicated. Obviously, this procedure can be simplified sparing a time of calculations and ensuring a necessary result.

The initializated field $\boldsymbol{X}^*$ can be obtained using the formula $\boldsymbol{X}^* = \sum_{i=-N}^{N} h_i \boldsymbol{X}_i$, where the values h_i ($i= -N,...,N$) are coefficients of a digital filter, $\boldsymbol{X}_i = \boldsymbol{X}(t_0+i\Delta t)$ ($i= -N,\ldots,N$), t_0 is an initial instant, Δt is a time step. The time series $\boldsymbol{X}_i$ ($i= -N,...,-1$) is obtained by adiabatically integration backward from $\boldsymbol{X}_0$ or by diabatically integration forward from $\boldsymbol{X}_{-N}$. (Huang and Lynch, 1993).

Using a symmetric digital filter, for example $h_i = h_{-i} = (0.5+0.5\cos(\pi i/(N+1))(N+1)^{-1}$ ($i=1,\ldots,N$), $h_0=(N+1)^{-1}$ (Jenkins and Watts, 1968), we can obtain the initializated field by the formula $\boldsymbol{X}^* = h_0\boldsymbol{X}_0 + \sum_{i=1}^{N} 2h_i\boldsymbol{X}_i$, where the time series $\boldsymbol{X}_i$ ($i=1,\ldots,N$) is the result of diabatically integration forward from $\boldsymbol{X}_0$. Obviously, the result of this filtration is determined only by magnitudes of the time interval $N\Delta t$ and the time step of integration Δt.

Note also that there are no essential arguments to use recursive filters (Lynch, 1993) invented for the purposes of radio engineering, where the filtration of a signal is carried out simultaneously with reception.

References

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