WAVELETS AND MULTIRATE DIGITAL SIGNAL PROCESSING

Lecture 8: Relation Between ϕ, ψ and Filters

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Self Evaluation Quizzes

Q 1. What do we lack in Haar filters?
Ans. Haar filters have their frequency responses far away from the ideal which we desire.

Q 2. What are the reasons which make ideal filters unattainable?
Ans. The unstable, irrational and infinitely non causal nature of the ideal filters make them unattainable.

Q 3. Are all non causal systems unrealizable?.
Ans. No, all non causal systems are not unrealizable. But here the system is infinitely non-causal. For a finite non-causality we can delay the system response.
Also in case of infinitely non-causal systems if some amount of error is allowed by the system then the previous approach for finite non-causal system can be used. But here the non-causal samples should be sufficiently small so that they can be ignored or are within the permissible error allowed.

Q 4. What is the inherent problem with irrational systems?
Ans. It takes infinite amount of resources i.e. adders, multipliers, delays, etc. to built up an irrational system. Therefore irrational systems cannot be realized.

Q 5. Does irrationality imply instability?
Ans. No, irrational systems can be stable.

Q 6. Specify the constraints on the impulse response $h[n]$ of a system to be stable and causal.
Ans. Condition for causality:

$$h[n] = 0, \quad n < 0$$

Condition for stability:

$$\sum_{n \in \mathbb{Z}} |h[n]| < \infty$$