1035-41-1767 **Vesselin I Vatchev*** (vesselin.vatchev@utb.edu), Math Dept., UTB/TSC, 80 Fort Brown, Brownsville, TX 78520. *Decomposition into Intrinsic Mode Functions.*

The Empirical Mode Decomposition(EMD) Method decomposes a function into a finite series of Intrinsic Mode Functions (IMFs). By relaxing the "mean" condition on the IMFs we consider the class of weak-IMFs and study methods for decomposing functions into a finite series of weak-IMFs.

In the talk we prove that a twice differentiable function f can be decomposed by using at most two weak-IMFs. Under some more assumptions on the smoothness of the function we show that there exists a Sturm-Liouville operator such that f can be decomposed into a linear combination of at most two eigenfunctions. The proof is constructive and is based on the characterization of IMFs as eigenfunctions of self-adjoint differential operators.

We also consider a variational approach to the decomposition. For example, the sifting process in EMD can be considered as minimizing the functional

$$\|f + pf' + qf'' - h\|,$$

over a class of continuous functions p and $q > 0$, and a function h with certain properties. The problem can be consider in various norms. The variational formulation enables us to develop different methods for IMFs decomposition, including multiscale decomposition. The relation between the EMD and the introduced methods is considered. (Received September 20, 2007)