1154-65-1465 **Ahmet Ozkan Ozer*** (ozkan.ozer@wku.edu), 1906 College Heights Hill Blvd, Department of, Western Kentucky University, Bowling Green, KY 42101. *Convergent semi-discrete finite difference approximations for the boundary control of partial differential equations.*

Space-discretized Finite Difference approximations for the well-known one-dimensional partial differential equations (PDEs), i.e. wave equation, beam equation, heat equation, do not preserve the so-called observability or controllability features of the PDEs as the mesh parameter tends to zero. This is mainly due to the loss of the uniform gap among the eigenvalues of the approximated finite dimensional model. To obtain a uniform gap, and therefore, an exact observability result, we consider an indirect filtering technique which involves adding viscosity terms to the PDEs. After filtering, as the mesh parameter goes to zero, the approximated solution space covers the whole infinite-dimensional solution space, and a uniform gap is achieved. Both the discrete multipliers and the non-harmonic Fourier series are utilized for proving the main results.

To show the strength of this technique, the PDEs for the Rayleigh (Kirchhoff) beam is considered. (Received September 15, 2019)