

A new pseudo-spectral operator is developed for time-spectral harmonic balance solutions of periodic unsteady flows. The method utilises a mechanism similar to sigma-approximation technique with Lanczos filtering function that alters the inverse of the discrete Fourier transformation matrix, leading to a modified pseudo-spectral operator. The modified operator is then used instead of the original operator that mimics the time-derivative term of the unsteady governing equations. The modified operator is capable of damping high-frequency nonlinearities in the harmonic balance solution, thus alleviating the effects of high-frequency oscillations that result in Gibbs-type phenomena. The effectiveness and robustness of the technique are demonstrated through various test cases.