SEMINAR ON APPLIED AND NUMERICAL ANALYSIS

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Title: Error Analysis of ZFP Compression for Floating-point Data

Abstract: Compression of floating-point data will play an important role in high-performance computing as data bandwidth and storage become dominant costs. Lossy compression of floating-point data is powerful, but theoretical results are needed to bound its errors when used to store look-up tables, simulation results, or even the solution state during the computation. In this talk, we address the round-off error introduced by ZFP, a state-of-the-art lossy compression algorithm. The stopping criteria for ZFP depends on the compression mode specified by the user; either fixed rate, fixed accuracy, or fixed precision [Lindstrom, ZFP version 0.5.3]. While most of our discussion is focused on the fixed precision mode of ZFP, we establish a bound on the error introduced by all three compression modes. Following the presentation of these error bounds, numerical tests are provided to demonstrate the accuracy of the established bounds.