Here we adopt the K-nearest neighbor (KNN) algorithm [24] for location estimation, and we fix the parameter *K=4*.

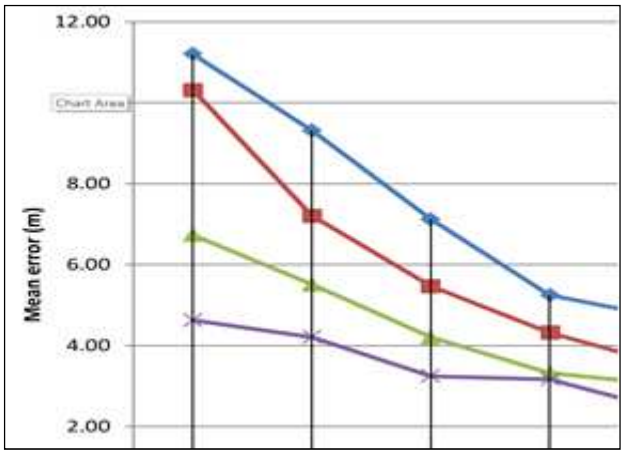

Fig.5 Positioning accuracy results

Fig. 5 shows the positioning results. Again the proposed method significantly outperforms the existing algorithms. When using 341 RPs, the mean error was *1.05m* for CHEB, *2.45m* for MOSM, *2.98m* for VORO and *2.84m* for CONV. For the worst case scenario with *RP=45*, results were *4.62m* for CHEB, 6.74m for MOSM, 10.32m for VORO and 11.20m for CONV.

IV. Conclusion

In this research, we proposed a new Wi-Fi fingerprint DB construction method based on signal approximation using Chebyshev wavelets. Compared to conventional, measurement-based algorithm, the proposed method requires only a few reference RSSI samples to be collected, and thus significantly reduces the calibration effort. Also, field test results showed that the proposed method achieves better approximation accuracy than existing interpolation methods, such as VORO and MOSM. The constructed fingerprint database was used for positioning, and the results showed that the positioning accuracy is significantly improved compared to conventional, as well as, state-of-the-art interpolation algorithms. In conclusion, we can state that the proposed approximation method using Chebyshev wavelets can create an accurate RSSI fingerprint database for indoor positioning systems.

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