



Fig. 5. Cross-section plot of the intensity of the phase conjugated focus: (a) Lateral direction; (b) Axial direction.

4. Conclusion

We have demonstrated three-dimensional phase conjugated scanning microscopy through turbid medium. Based on the optical memory effect, we show that the phase conjugated focus can be displaced from its original position in all three dimensions with controlled distance. We find that the scanning range in the longitudinal dimension is consistently larger compared to the transverse scanning range. This fundamental difference between transverse and longitudinal scanning will be explored further in a forthcoming publication. In the experiments, the scanning is achieved digitally by modulating the phase-conjugation pattern projected onto the phase-only SLM. Fluorescent beads of three dimensional distributions are used as the imaging target. The scanning images agree well with the wide-field images. This technique is adaptable to other imaging methods through turbid media such as wave front shaping, and provides the possibility for fast three dimensional imaging through thin biological tissue.