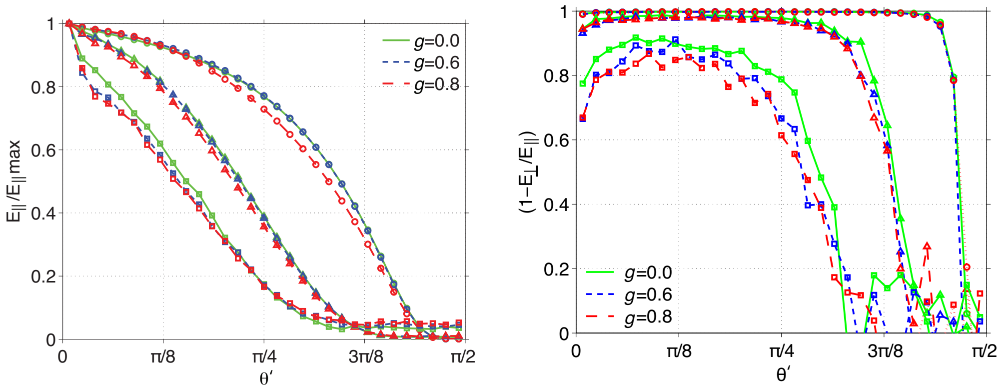

Fig. 7. (a) $E_{\parallel}$ normalized by maximum value, and (b) $(1-E_{\perp}/E_{\parallel})$, as a function of the wave's exiting angle (θ') for anisotropy coefficients $g = 0, 0.6, 0.8$ and slab thicknesses of $T = 1l_s(\circ), 3l_s(\triangle), 5l_s(\square)$.

spatial broadening, and depolarization of the focal field.

Our results indicate that the loss of focal field amplitude with focusing depth is governed predominantly by the scattering coefficient μ_s rather than by the scattering anisotropy g. This implies that the properties of the focal volume are dictated primarily by the number of scattering events and that the direction of scattering plays a relatively minor role. The major effect of tissue scattering is the increased amplitude loss and phase delay for wavefront components **k** with large propagation angles. This modifies the angular spectrum, in that the low angle **k** components gain more importance relative to the high angle components. Effectively, the scattering medium acts as a low pass filter of the angular spectrum, and results in a broadening of the focal fields in both the lateral and axial dimensions. This low pass filtering mechanism also explains why effective broadening of the focal fields is less severe for lower *NA* objective lenses, as the angular spectrum of a low *NA* lens intrinsically encompasses only lower angular components. Although effective broadening of the focal volume results directly from tissue scattering, our model confirms quantitatively that spatial distortions of the focal fields are relatively minor.

In addition, the full vectorial nature of the EMC approach allows a direct assessment of the depolarization rate of the focal fields. Our simulations indicate that while the depolarization of higher angular components can be substantial for large slab thicknesses l^*, this effect is subordinate to the corresponding coherent amplitude loss. We conclude that for the scattering media examined, the loss of coherent amplitude due to phase scrambling is much more severe than depolarization within the focal field of a tightly focused laser beam in turbid media.

All of the trends predicted by the simulations presented here are in good agreement with experimental observations. The EMC model for focused light in the limit of the random scattering approximation thus provides a reliable prediction of the excitation field in turbid media based on macroscopic tissue scattering parameters. We expect this approach to be particularly relevant to predict the performance of coherent imaging techniques applied to turbid media, which crucially relies on a full assessment of the amplitude and phase of the focal volume.

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