4. Conclusions

We have demonstrated that the use of strong optical injection in a QDash laser significantly increases the differential gain of the device. This technique allows for manipulation of the LEF to near-zero values and significant enhancement of the 3-dB modulation bandwidth. We have found greater than 50X improvement in the differential gain in an injection-locked QDash FP laser compared to its free-running value as a result of strong optical injection at wavelengths blue-shifted from the gain peak and operation near optical transparency. A broadband and flat response with a simultaneous, near-zero LEF indicate that this optically-coupled nanostructure laser system has the potential in future long-haul and high performance optical fiber links as an RF photonic transmitter for demanding applications and environments.

Acknowledgments

This work was supported by the United States Air Force Research Laboratory under grant numbers FA8750-06-1-0085 and FA9550-10-1-0276 managed by Dr. Gernot Pomrenke. Vassilios Kovanis' work was supported via the AFOSR Electromagnetics Portfolio of Dr. Arje Nachman.