Abstract Submitted
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**Finite-element modeling of thermal gradients during non-local thermal spin injection**[1] ZIHAO YANG, Department of Electrical and Computer Engineering, The Ohio State University, Columbus, Ohio 43210, USA, BRANDON GILES, JOHN JAMISON, Department of Materials Science and Engineering, The Ohio State University, Columbus, Ohio 43210, USA, ROBERTO MYERS, Department of Electrical and Computer Engineering, The Ohio State University, Columbus, Ohio 43210, USA — A new spin Seebeck experiment has been demonstrated, in which a laser is focused on an electrically isolated Pt absorbing pad on yttrium iron garnet (YIG), thermally generating a spin current in YIG.[1] The spins diffuse laterally and are detected non-locally on a remote Pt detector via the inverse spin Hall effect ($V_{ISHE}^{non-local}$). This geometry is expected to remove parasitic thermal transport voltages unrelated to the magnonic spin current that could contaminate $V_{ISHE}^{non-local}$. To validate this, 3D steady-state heat conduction equations are solved to determine the stray temperature gradient at the Pt detector as a function of distance from the laser heating source. We find that the temperature gradient beneath the Pt detector vanishes when the laser is laterally displaced (along x) by 50$\mu$m. The gradient along the interface normal follows $\nabla T_z(x) \sim e^{-1.76x}$ and the gradient parallel to the interface follows $\nabla T_x(x) \sim e^{-0.08x}$. Both gradients decay much faster than the measured $V_{ISHE}^{non-local}(x) \sim e^{-0.025x}$ demonstrating the validity of the non-local geometry in probing laterally diffused spin. [1]B. Giles, et al., 2015 APS March meeting abstract

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