1135-49-2701 **Nicholas H. Nelsen*** (nnelsen@okstate.edu), Dept. of Mathematics, Dept. of Mechanical & Aerospace Engineering, Oklahoma State University, Stillwater, OK 74074, **Weiwei Hu**, Dept. of Mathematics, Oklahoma State University, and **Omer San**, Dept. of Mechanical & Aerospace Engineering, Oklahoma State University. *PDE-constrained optimal flow control in cooling applications.* Preliminary report.

We present the optimal control problem of convection-cooling between a hot fluid and cold fluid in two bounded domains separated by a common interface. The aim is to devise an optimal boundary control input that stirs the cold fluid at this interface to minimize the average temperature of the hot fluid. This is of relevance for effective heat transfer in systems with rotating walls or applications involving mixing. We control the cold fluid flow velocity to optimally cool the hot fluid in such a way that maintains a more even distribution of cold fluid temperature for improving circulation. The hot fluid is represented by a low Reynolds number Stokes flow heated on the boundary of its domain and the cold fluid is subjected to Navier slip boundary conditions. We use a gradient descent based iterative scheme to implement our control design. (Received September 26, 2017)