Parametric Study of Natural Convection Loop Model

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Abstract. This study presents our developing natural convection loop model tailored to analyze heat transfer within oil-filled transformers. By performing a detailed parametric study of temperature and velocity dependence on geometric ratios within the loop -- specifically, the ratio of heated to unheated channel lengths and channel to fin widths, we identified the conditions under which cooling performance is optimized. The findings reveal the optimized interval for channel to fin widths ratio is determined by the maximum value for channel velocity and parameter *A*.