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# On the Design of Miniature Parallel-Plate Differential Mobility Classifiers

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## ABSTRACT

The effect of design parameters of particle classification channel on the performance of miniature parallel-plate differential mobility classifier (i.e., mini-plate DMCs) was numerically investigated in this work to establish the general design guideline for compact parallel-plate DMCs. The design parameters under consideration were the aspect ratio and the cross-sectional area of the particle classification channel, the percentage of aerosol inlet and exit slit opening (relative to the full width of the classification channel), and the aerosol injection angle. COMSOL Multiphysics 5.3® and MATLAB R2016a® were used in this numerical modeling. Prior to the parametric study, our modeling was validated by comparing the numerical result with the experimental data published by Liu and Chen (2016a). Our study shows that the performance of mini-plate DMCs deteriorated as the channel aspect ratio reduced to a value less than eight. The opening percentage of aerosol inlet and exit slits was also an important factor for the mini-plate DMC design. The peak of DMC transfer function decreased as the aerosol opening