

Supplementary Information:

**Effect of Inner Rod Tilting on the Performance of a Cylindrical Differential
Electrical Mobility Analyzer (DEMC)**

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Equation for the maximal tilting angle θ_m of inner rod

In general, the maximal tilting angle θ_m of inner rod in the cylindrical DEMC classification channel can be calculated given the DMC dimensions of the classifying channel length L and the inner and outer cylinders radii R_1 and R_2 . The derivation of the equation for the maximal tilting angle can be found in the following:

Shown in Fig. 1a is the extreme tilting of inner rod in the DEMC classification channel. Accordingly, $X_1 = X_2 + R_1$. More, the values of X_1 and X_2 can be calculated via the trigonometric relation as $X_1 = R_2 \cos \theta_m$ and $X_2 = L \tan \theta_m$ (as shown in the Figs. 1b and 1c). Thus, the final relation for determining the θ_m can be expressed as: $R_2 \cos \theta_m - L \tan \theta_m = R_1$

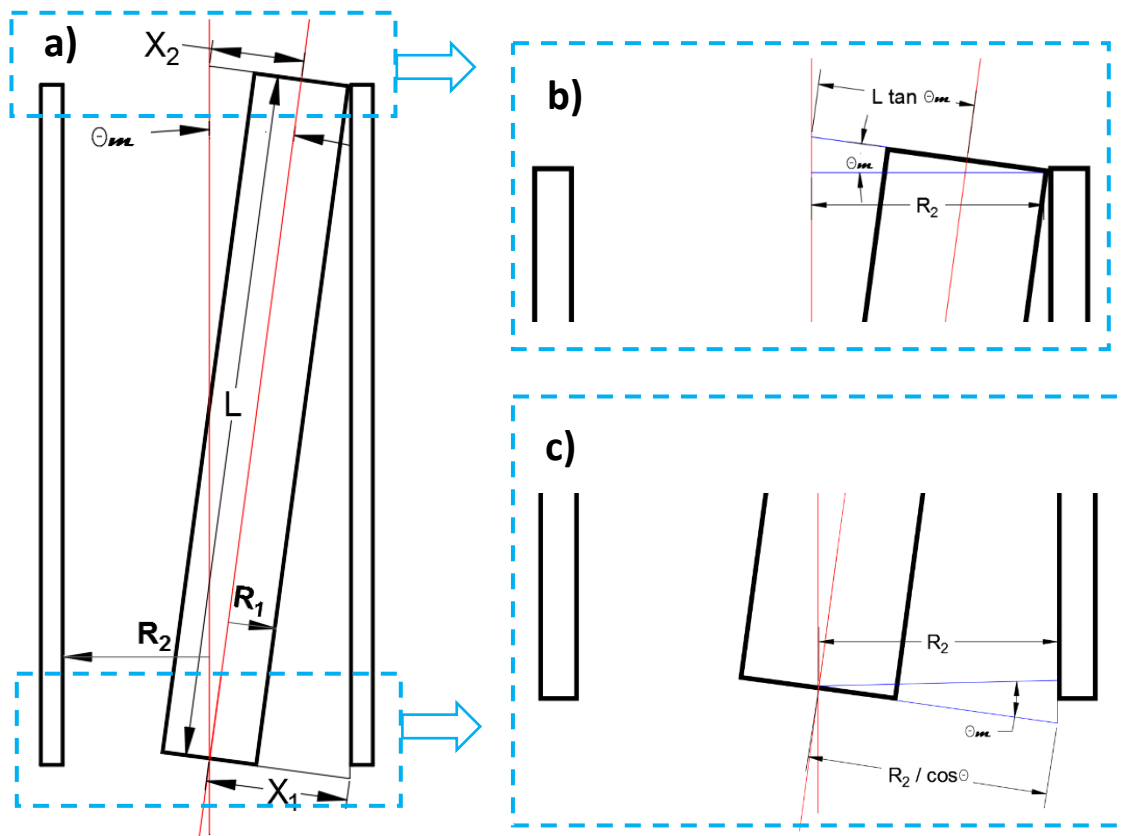


Figure 1. Geometrical illustration of the relationship of L and R_1 and R_2 to the maximal tilting angle θ_m of inner rod in a cylindrical DEMC.