**Supplementary Information:**

# Effect of Inner Rod Tilt on the Performance of a Cylindrical Differential Electrical Mobility Classifier (DEMC)

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**Equattion for the maximal tilting angle $\theta_m$ of inner rod**

In general, the maximal tilting angle $\theta_m$ 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 trigonometic 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 $\theta_m$ can be expressed as: $R_2 \cos\theta_m - L \tan\theta_m = R_1$

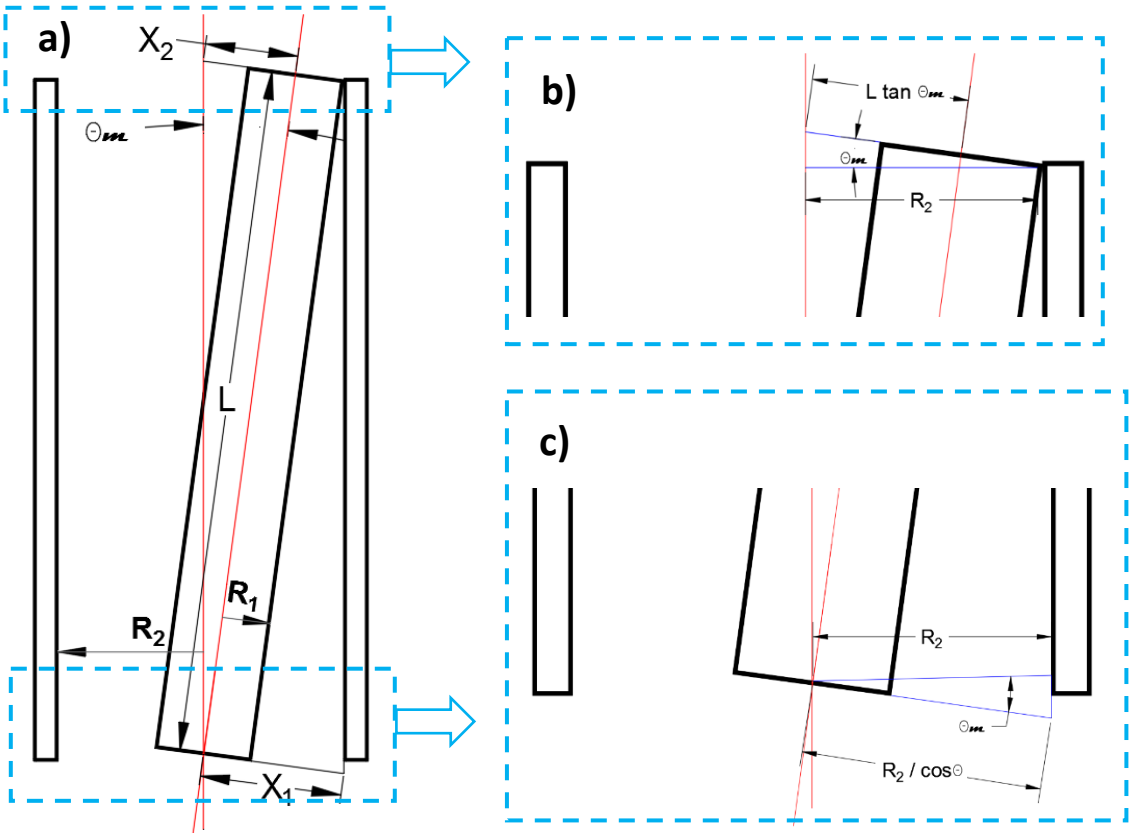


Figure 1. Geometrical illustration of the relationship of L and $R_1$ and $R_2$ to the maximal tilting angle $\theta_m$ of inner rod in a cylindrical DEMC.