If the motor and the driver are ideal, $B = 0$. Because $C_1 = \frac{K}{B}$ and $C_2 = \frac{J}{B}$, C_1 and C_2 become undefined in this case. C_1 can be interpreted as the steady state value for $V_{in} = 1$V. C_2 is the time constant.

Substitute $B = 0$ into equation (**??**).

$$V_{out}(t) = \frac{K}{J} \int_0^t V_{in}(t')dt' \tag{1}$$

Assume that the input is the step function $V_{in}(t) = V_{in}1(t)$.

$$V_{out}(t) = \frac{KV_{in}}{J} t \tag{2}$$

The steady state value grows without bound. Therefore, the time constant grows without bound as well. So, neither is a constant in this case. Therefore, neither C_1 nor C_2 is a constant.

Neither C_1 nor C_2 are observed to be constant in the experiment. The C_1 values are similar in the 4V and 4.5V reference voltage cases. The C_1 values may not necessarily be similar since the dynamics of the motor may not be linear, which explains why K varies. The model assumes that the motor torque depends linearly on the input current. These linear dynamics do not hold in practice. Therefore, the K will not be constant. If B is assumed to be constant, then $\frac{K}{B} = C_1$ is not constant.

The moment of inertia J of the rotor is unlikely to vary with the reference voltage. Thus, nonlinearities in the damping behavior of the motor must cause C_2 to not be constant. Damping may depend on other higher-order terms than angular velocity, such as angular acceleration or angular jerk. As a result, B may not be constant, leading to $C_2 = \frac{J}{B}$ not being constant. If B is not constant, then it must vary with the reference voltage differently from K so that C_1 is still not constant.

However, if an "ideal motor" is defined as a motor with a constant damping factor B, then neither C_1 nor C_2 depend on the reference voltage V_{in} per equations (**??**) and (**??**).