(a)

(b)

Fig. 3. Waterfall plots of the squeal noise and vibration: (a) noise and (b) vibration.
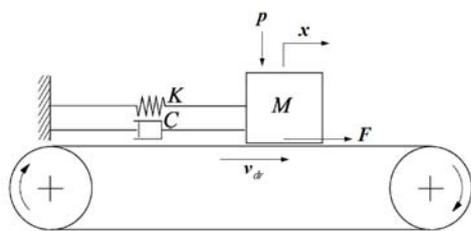

Fig. 4. Single-degree-of-freedom model for verification of squeal noise mechanism.

3 shows that the squeal frequency converges to about 2800 Hz as the rotating speed increases. It can be verified by the modal test for the wiper blade that this converged frequency coincides to the natural frequency of the blade.

To understand the squeal noise mechanism, a single-degree-of-freedom model for a stick-slip motion is adopted, as shown in Fig. 4. The mass M is on a moving belt with a constant speed and a spring K and damper C are attached to the mass. The time responses for this model are used to analyze the effects of the negative gradient of the friction coefficient, arm pressure, damping coefficient, and relative speed of the friction surfaces.

III. CONCLUSION

It is found from this study that the negative gradient of the friction coefficient, arm pressure, damping coefficient and relative speed of the friction surfaces influence the squeal noise generated by the friction between the wiper blade and windshield grass. We propose some suggestions to reduce the squeal noise of a wiper blade system.

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