FH267

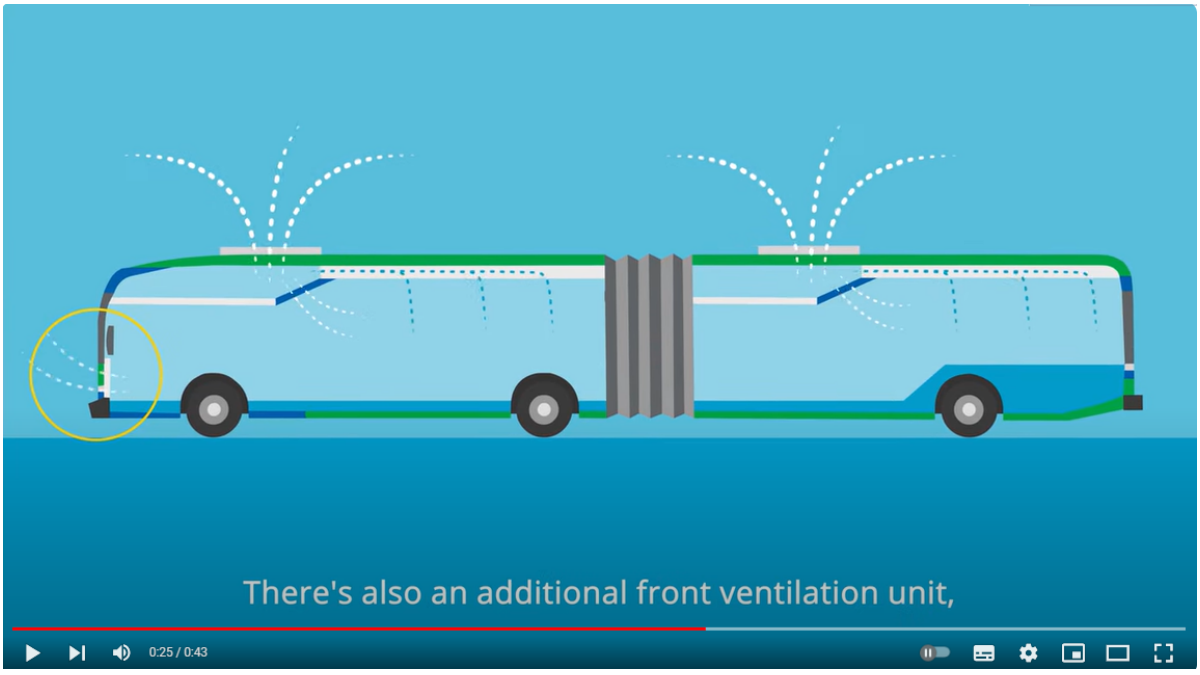
Projet

- Open or close the bus window in Russia --- FIGHT!
- 公交车开空调开窗运行，你支持吗?
- CMV: All buses and trains should have windows that open.
- Une bagarre passive-agressive a lieu dans un bus : une guerre silencieuse a lieu pour une histoire de fenêtre

bus model

- https://3dmdb.com/en/3d-model/solaris-urbino-18-pack/373457/?q=Solaris-Urbino-12-Bus
- Solaris Urbino 18 Pack
- Irisbus IVECO: Citelis

Bus HVAC Solutions



暖通工程 HVAC

还要考虑HVAC的安装位置

self-exhaust

消除错觉

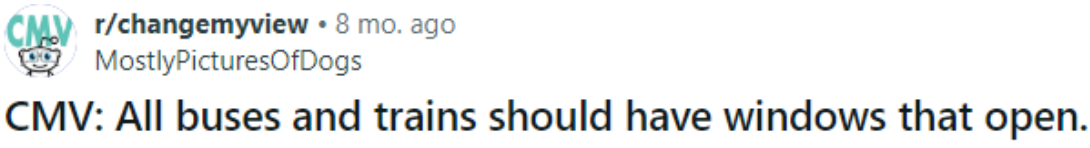
冲突是无所不在的, 甚至可以说有人的地方就有冲突. 如果没有正确合理的解决方案, 冲突或许会升级, 给更多的人带来不幸. 我研究的主题是我们日常生活中的一个冲突: 在公交车上, 有人想要开窗户, 有乘客想关窗户? 这个时候应该怎么处理？尤其是我们有没有可能借助innovation numerique来缓解冲突, 甚至彻底解决冲突?

针对这个问题我想从以下几点来说明我的想法:

- [ ] 冲突的表现
- [ ] 冲突的原因
- [ ] 解决冲突的方案
- [ ] 类似事件的和平希望

冲突的表现

CMV https://www.reddit.com/r/changemyview/comments/13458w6/cmv_all_buses_and_trains_should_have_windows_that/



- 作者充分表达了自己的观点并给出理由:
  - HVAC系统无法达到新鲜空气的效果
  - 再拥挤的火车或是公交车上脱掉外套不方便.
  - 空调浪费资源, 风更环保
- 评论区:
  - 火车不适合开窗因为过快, 而且在发生事故时起到保护作用.
  - 但是对于bus的讨论不多, 似乎是高速火车上开窗户带来的危险远大于通风的好处.

https://www.reddit.com/r/changemyview/comments/13458w6/cmv_all_buses_and_trains_should_have_windows_that/

Jonathan Tamm
Former Fitter and Machinist at General Motors (Corporation) (1978–1984) · Author has **9K** answers and **10.5M** answer views · 1y

Most new buses are air conditioned I got one of the last x school buses that was not air conditioned for my motor home conversion.

Only the top narrow windows are openable I just tried and got my head out but it was too narrow for the rest of me the bigger drivers window I can fit through

7 1 1

我们在这里要限定场景为城市中速度上限为50公里/h左右的bus, 如果是速度更快的交通工具我们要考虑安全性以及燃油损耗的问题. 我们可以用9106公交车为例子: https://www.youtube.com/watch?v=9Hf5hWmTgqw

我查到有两种比较主要的车型:

- Solaris Urbino 18
- Irisbus IVECO: Citelis 18
- bus articulé

冲突的原因

对于想要关窗户的人来说:

- 不喜欢室外的温度, 大多数是外冷内热的情况.

对于想要开窗户的人来说:

- 新鲜空气
- 室外温度, 大多数是外冷内热的情况, 嫌车内太热.

Effects of the window openings on the micro-environmental condition in a school bus

- The dimensions of the bus cabin are 7.6 m (L) 2.2 m (W) 2.4 m (H), and the cabin includes eight rows and 41 seats. The window gaps and studied window positions are also marked, and no air-conditioning (AC) is used.

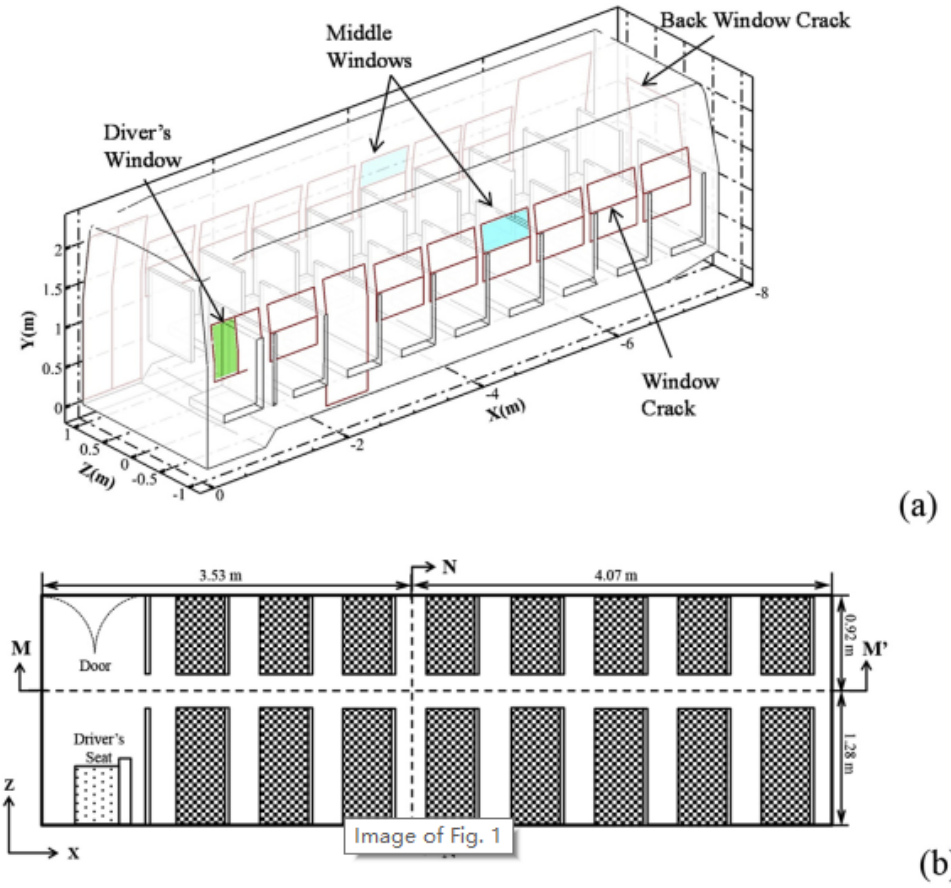
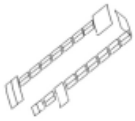
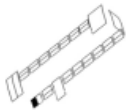
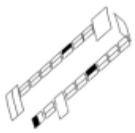
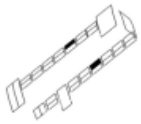


Fig. 1. Geometrical characteristic of the school bus. (a) Digital geometry model used in CFD. (b) Top view of the bus cabin.

Table 1
Summary of modeling scenarios.

Modeling scenarios			Model predictions				
Case nO.	Schematic view	Speeds	$\overline{AA}$ (s)	τ (s)	Q_{total} (m^3/s)	$Q_{back\text{-}in}$ (m^3/s)	Q_{cross} (m^3/s)
A20	All Windows Closed	20 mph	130	172	0.20	0	0.10
A40		40 mph	139	85	0.41	0	0.12
A60		60 mph	40	50	0.68	0	0.32
D20	Only Driver's Window Open	20 mph	71	74	0.47	0.010	0.29
D40		40 mph	34	36	0.96	0.018	0.58
D60		60 mph	22	22	1.57	0.035	1.00
DM20	Both Driver's and Middle Windows	20 mph	49	53	0.65	0	0.56
DM40		40 mph	24	26	1.33	0	1.10
DM60	Open	60 mph	14	15	2.28	0	1.93
							
M20	Only Middle Windows Open	20 mph	91	122	0.28	0	0.19
M40		40 mph	47	59	0.58	0	0.41
M60		60 mph	31	35	0.99	0	0.69

$\overline{AA}$: Average value of age of air for the whole cabin.
τ: Time constant.
Q_{total}: Ventilation rate of the cabin.
$Q_{back\text{-}in}$: Infiltration airflow rate that penetrated into the cabin through gaps on the back surface.
Q_{cross}: Airflow rate through the cross section NN'.

Effects of the window openings on the micro-environmental condition in a school bus

4. Conclusions

This study adapted a CFD-based numerical model and field measurements to investigate the effect of window openings and bus speed on the airflow pattern and air quality inside school buses. By opening the side-windows in different positions, the airflow pattern and self-pollution level in the cabin was analyzed. The conclusions are as follows:

1. The proposed CFD-based method assigned the actual relative pressures to a certain percentage of boundary cells according to the effective area ratio of the gap boundaries. It was a trade-off between the computer capacity and basic need for describing geometry. This method can predict the airflow rate from the window gap infiltration and the results agree well with experimental data.
2. For the effect of the window openings, the self-exhaust can penetrate into the cabin through back door gaps more easily when only the driver's window was open. However, opening the middle windows could mitigate this phenomenon. Therefore, it is advised that the divers of school buses should not open the driver's window alone and at least make sure the side-windows in the middle are open. In addition, for all the scenarios, the age of air in the middle section of the cabin is lower because most of the air enters through the middle gaps and windows. Lower UFPs I/O ratio was also observed in the middle section of the school bus in the experiment.
3. For the effect of the bus speed, higher speed (from 20 mph to 60 mph) resulted in a higher ventilation rate of the cabin (up to 3.4 times) and a lower average value of age of air for the whole cabin (down to 0.29 time) corresponding to more observable “pump” effect. However, more air would penetrate into the cabins through the back window gaps at a higher speed.

Disease transmission through expiratory aerosols on an urban bus

- 开窗有益, 但窗边的人不一定好
- HVAC系统有一定作用, 60次空气更换

Air exchange rates and advection–diffusion of CO2 and aerosols in a route bus for evaluation of infection risk

The ACH increased as the speed of the bus increased, regardless of AC operation and whether windows were open or closed (Figure 3A–D)

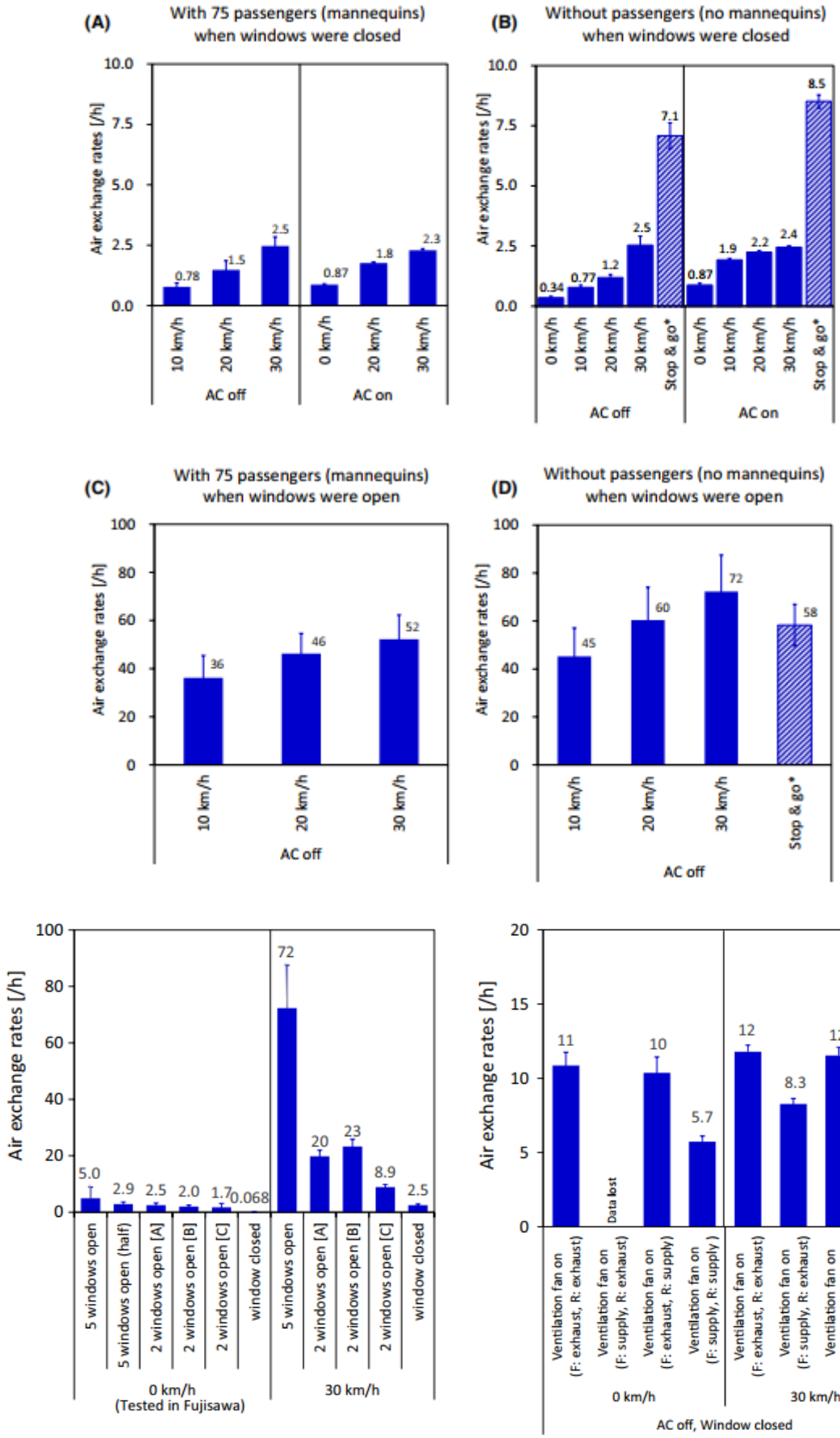


FIGURE 4 ACH in the bus without mannequins but with different numbers of open windows. The stationary tests were conducted in the car barn at the Fujisawa plant, and the moving tests were conducted outdoors at Tsukuba. (A) Right front and left rear windows open; (B) right front and right rear windows open; (C) right rear and left rear windows open

FIGURE 5 Effects of ventilation fan operation on the ACH in the bus without mannequins. F and R indicate the front and rear ventilation fan, respectively

5 | CONCLUSION

The ACH increased when the number of open windows increased and as vehicle speed increased. When the windows were open and the bus was moving, operation of the ventilation fans made no difference. Therefore, it is not necessary to operate ventilation fans while a bus is moving with windows open. While the bus was moving with the windows closed, it was effective to operate the ventilation fans by setting both the front and rear fans to exhaust or by setting the front fan to exhaust and the rear fan to supply. We confirmed that opening windows greatly reduces the risk of infection (92% in a moving bus), and that when the windows are closed, the risk of infection can be reduced by setting both front and rear ventilation fans to exhaust (35% in a moving bus). Although the risk is possible to be reduced by using even a coarse dust filter, a better-performing filter can be effective in reducing risk, especially when the AC is to be operated.

Air flow through a non-airconditioned bus with open windows

The studies show that flow inside a bus with open windows is complex. Outside air enters the bus from the rear windows, moves forward relative to the bus at about 1/10th the bus speed and exits from the front windows. The size and nature of the re-circulation regions on the side and top are different. Although the Reynolds numbers for water channel tests and numerical simulations differed, the agreement in respect of broad flow characteristics, qualitative and quantitative, was good. This study forms a basis for further investigations on the effects of roof and side vents, fans and blowers, window design and setting changes, thermal effects, and passenger loading, as well as less expensive methods for airconditioning. The study can also be extended to road dust entrainment and fire safety of such buses.

我将从四个方面说明我的观点:

1. 冲突的表现
2. 冲突的原因
3. 解决冲突的方案
4. 解决类似事件的思路

正稿

Les conflits sont omniprésents, on pourrait même dire qu'il y a des conflits partout où il y a des gens. Sans des solutions appropriées et raisonnables, les conflits peuvent escalader et apporter du malheur à davantage de personnes. Le sujet de ma recherche porte sur un conflit dans notre vie quotidienne : dans un autobus, certaines personnes veulent ouvrir les fenêtres, tandis que d'autres passagers préféreraient les fermer. Comment devrait-on gérer cette situation ? Surtout,

est-il possible d'utiliser l'innovation numérique pour atténuer voire résoudre complètement ce conflit.

Je vais expliquer mon point de vue à partir de quatre aspects :

1. Les manifestations du conflit
2. Les causes du conflit
3. Les solutions pour résoudre le conflit
4. Les approches pour résoudre des conflits similaires

Reddit

L'auteur a pleinement exprimé son point de vue et fourni des raisons :

- Le système HVAC ne parvient pas à garantir une qualité d'air frais.
- Il est peu pratique de se dévêtir dans des trains ou des bus déjà surpeuplés.
- La climatisation est une source de gaspillage de ressources, tandis que l'utilisation du vent est plus écologique."

Commentaires :

- Les fenêtres dans les trains ne sont pas adaptées à être ouvertes en raison de leur vitesse élevée, et elles jouent un rôle protecteur en cas d'accident.
- Cependant, il y a peu de discussions concernant les bus. Il semble que les dangers potentiels liés à l'ouverture des fenêtres dans un train à grande vitesse l'emportent sur les avantages de la ventilation."
- "La résistance au vent est trop importante, ce qui entraîne un gaspillage de carburant."

La vidéo dure près de 5 minutes. Deux passagers, pour exprimer leur désir d'ouvrir ou fermer les fenêtres, répètent l'action à plusieurs reprises sans qu'un conflit direct n'éclate. Les deux agissent de manière très courtoise, attendant respectueusement que l'autre termine son action avant d'entreprendre la leur.

- La méthode proposée basée sur la dynamique des fluides numérique

Flux d'air

Plus le chiffre est petit, meilleur est l'effet de ventilation

Scenarios	**AA(s) à 20mph (32 km/h)**
All Windows Closed	130
Only Middle Windows Open	91

Scenarios	AA(s) à 20mph (32 km/h)
Only Driver's Window Open	71
Both Driver's and Middle Windows Open	49

Les dimensions sont les suivantes : 7,6 m (longueur), 2,2 m (largeur), 2,4 m (hauteur).

- taux de renouvellement de l'air

- 司机开快一些
-

1. 速度越快, 空气流通越快, 无论车窗开还是关.
2. 普通的空调作用很小
3. 乘客会阻碍车厢内的空气流动

Beaucoup rond point., tournant.

"À court terme, nous pouvons atténuer le conflit dans une certaine mesure en établissant des "règles obligatoires", par exemple, Solutions 1 et 3. Cependant, à long terme, il est toujours nécessaire de résoudre fondamentalement le problème en développant la technologie, telle que la fabrication de moyens de transport public plus écologiques et rapides, ainsi que des systèmes de chauffage, ventilation et climatisation (HVAC) plus efficaces."