

Minecraft Gaming Elasticity Solver Modification

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Background

Problem:

- What are other ways to teach o teach statics and other engineering concepts

What is Minecraft?

- One of the most popular games of all time
- Sandbox game
- Allows modding

Methods

Why use Minecraft for Statics?

- Facilitates problem-solving skills
- Visual and hands-on learning
- Real-world applications

My Role

- Develop and test out the mod → build bridges and structures
- Figure out challenges to gain player engagement → Find fun structures to build
- Understand mod functionality and statics fundamentals → Understand how the code works and the theory behind statics

How The Mod Works

Mod Implementation

- Color Tier System
 - Violet = best and Black = bad
- Series of commands to perform calculations

Minecraft Elasticity in Action 1

```
Time Steps: 4987 | Deflection: -0.000549 m
Time Steps: 4988 | Deflection: -0.000549 m
Time Steps: 4989 | Deflection: -0.000549 m
Time Steps: 4990 | Deflection: -0.000549 m
Time Steps: 4991 | Deflection: -0.000549 m
Time Steps: 4992 | Deflection: -0.000549 m
Time Steps: 4993 | Deflection: -0.000550 m
Time Steps: 4994 | Deflection: -0.000550 m
Time Steps: 4995 | Deflection: -0.000550 m
Time Steps: 4996 | Deflection: -0.000550 m
Time Steps: 4997 | Deflection: -0.000550 m
Time Steps: 4998 | Deflection: -0.000550 m
Time Steps: 4999 | Deflection: -0.000550 m
Sim Complete, Changing Block Colors based on von Mises Stress
Max VMStress: 75.819 kPa
Elapsed Time: 0:44
Number of blocks: 146
Total Weight + Load: 131400.0
Bottom out: 0
End: 5
```

Apply /RunSPH
Max deflection per step
Summary after running /RunSPH

Game Development Features

- Worlds with different challenges
- Video tutorials about the mod
- Test if a structure will stay standing in real life

Minecraft Elasticity in Action 2

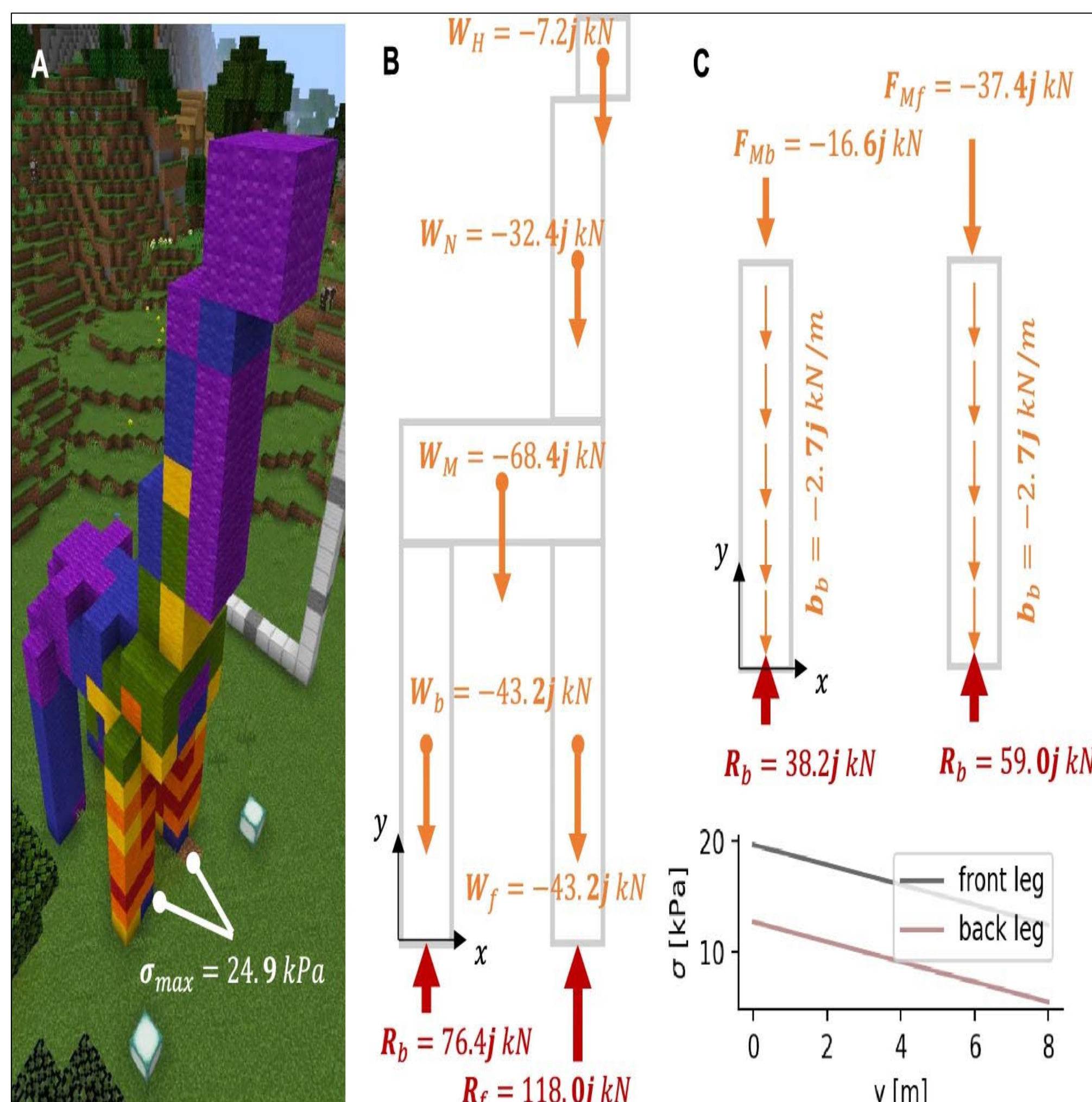


Minecraft with Statics

What is Statics?

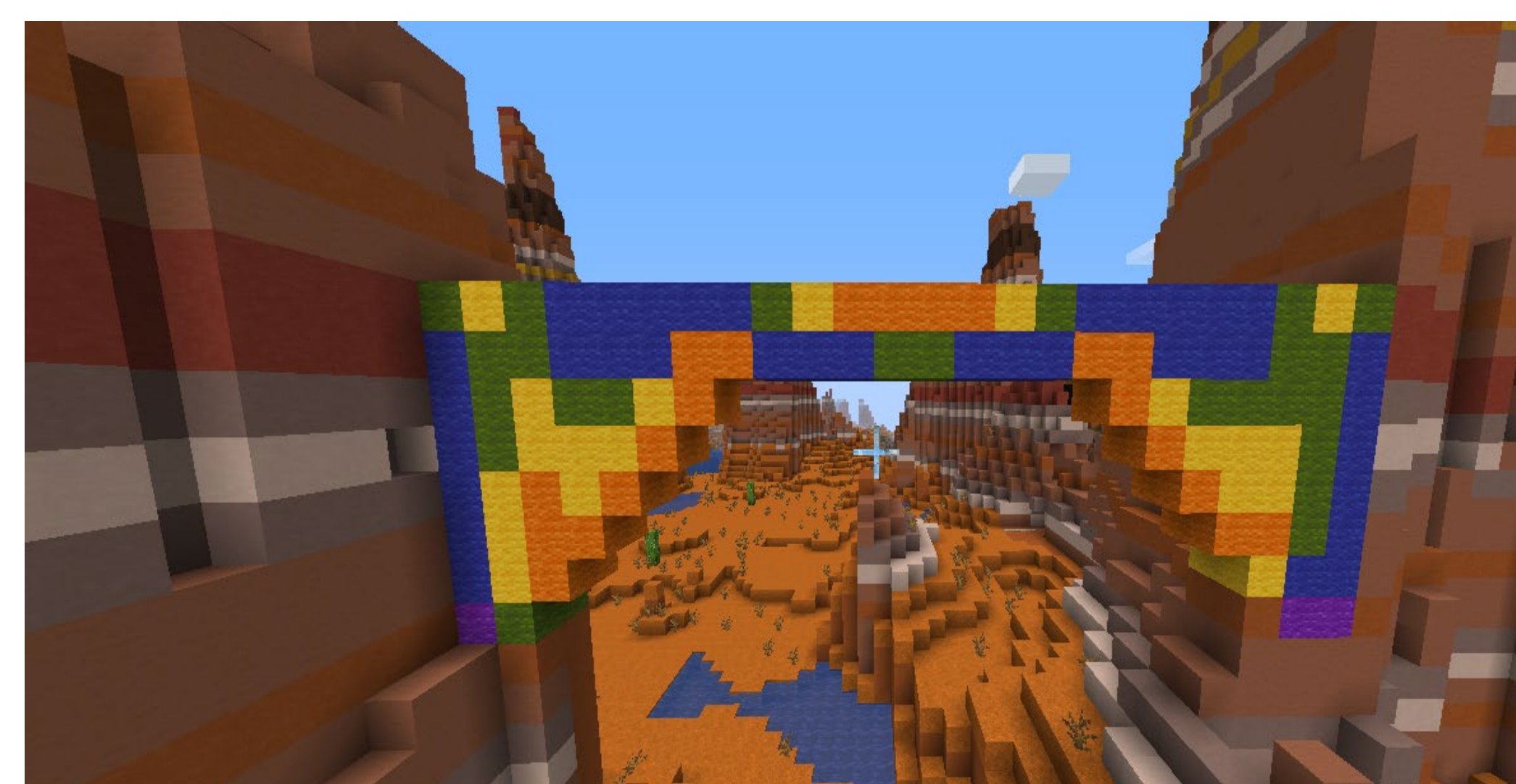
- Image a game of balance
- Helps us build structures and objects
- Statics = forces

Analysis of Static Forces in Minecraft



What You Can Do With The Mod

Bridges



Other Structures



Conclusion and Future Questions

Conclusion

- Apply theoretical knowledge
- New approaches to teach engineering

Future Work

- Does the mod increase engagement with statics material?
- Are the things you learn in class transfer to the mod and vice versa.

References and Acknowledgement

[1] Beck, Zachariah, et al. "Elasticity Solver in Minecraft for Learning Mechanics of Materials by Gaming."

[2] Philpot et al., 2003, "Games as Teaching Tools in Engineering Mechanics Courses,"

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