PDE - Diffusion Modeling of Seasoning Powder

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Background and Introduction

Challenge

Understand the effect of vibrating plane on the particle dynamics.

Toy model

Force balance ODE for single particle.

First Goal

What powder distribution do we obtain from the model over many simulations ?

Figure: Non-uniform seasoning leads to reduced taste enjoyment, as can be seen.

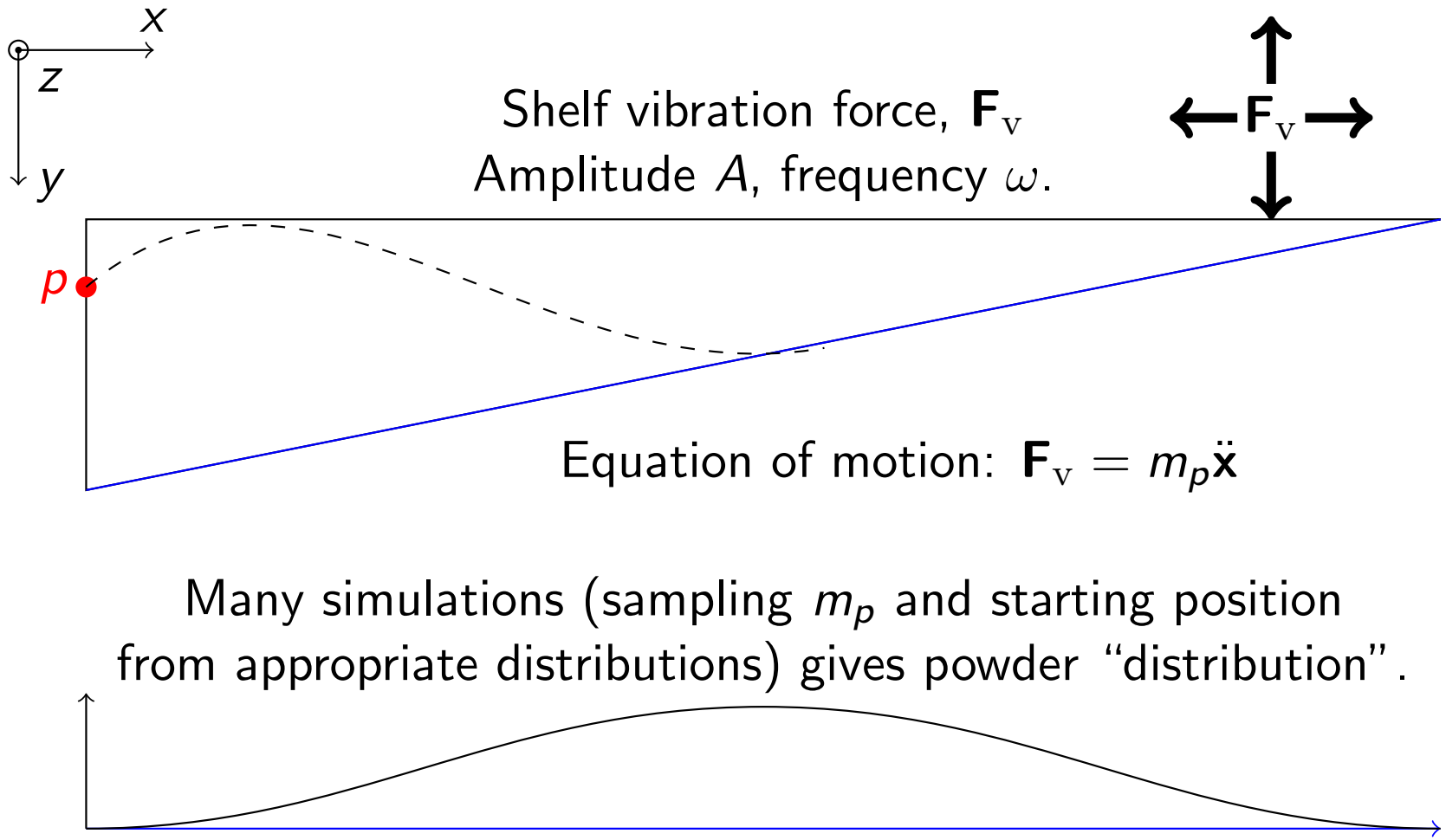

Figure: Toy model to be adapted and improved throughout the week.

Future Objectives

Goals and Challenges

- Extension from single particle to diffusion model with viscosity
  - It is not obvious which numerical scheme could be employed (Euler/Lagrange/FEM method)
  - Is viscosity the correct mechanic to model the "stickyness"
- Given a desired powder distribution, how can we formulate an inverse problem?
  - What is the answer to this inverse problem?
  - Is this profile optimal for uniform seasoning (considering bounciness of particles)?
- Can we formulate this as an exit-time problem?
  - Better way to account for inter-particle interaction.
  - Provides a better framework for parameter estimation for model calibration.