

Discrete Sandwich Theory
Math Slam - BMS Days 2013

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February 18th 2013

Sandwich Theory: Theoric and Applied

Historically, the sandwich dates back to John Montagu (4th Earl of Sandwich) (1718-1792).



Sandwich Theory: Theoric and Applied

Definition (Merriam-Webster)

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Sandwich Theory - Overview

Just like any Theory, Sandwich Theory has two counterparts:

Discrete	Continuous
Separated condiments	smooth condiments (Sauce Mixes)
Separated fillings	smooth interaction between layers
⋮	⋮

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In continuous Sandwich theory, you can study **calculus on sandwiches...**

In discrete Sandwich theory, you can **enumerate sandwiches** and **study the interaction between them...**

Discrete Sandwich Theory - Basics

Definition

The **empty sandwich** is the sandwich formed with 2 slices of bread with no filing between them.



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Definition

Let \mathbb{P} be the set of finite sandwiches (where the number of filing is finite), and $\{B - L - T\}, \{M\} \in \mathbb{S}$ two sandwiches. The **superposition** $\{B - L - T \setminus M\}$ is obtained by concatenation of filings.

Discrete Sandwich Theory - Basics

An example of superposition:

Definition (Triple-decker)

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Example



Algebraic structure - Finite sandwiches ring

Since sandwiches often come with a **combo** (+).

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Lemma

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Theorem (Fundamental Theorem of Sandwich Theory)

If we assume that a sandwich is reversible, then every finite sandwich combo is the superposition of prime sandwiches and units (siders).

Field of sandwiches using category theory

Theorem

Then \mathbb{S} is embeddable in a field \mathbb{F} .

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Proof.

(\mathbb{P}, \setminus) is then a cancellative commutative monoid. [Uses the Grothendieck's group construction]. □

$$(\mathbb{P}, \setminus) \hookrightarrow \mathbb{S} := (\mathbb{P} \cup -\mathbb{P}, \setminus, +) \hookrightarrow (\mathbb{F}, \setminus, /, +, -)$$

Sandwich theory expert

Sheldon : *Well, this sandwich is an unmitigated disaster. I asked for **turkey and roast beef with lettuce and swiss on wholewheat.***

Raj : *What did they give you?*

Sheldon : *Turkey and roast beef with swiss and lettuce on wholewheat. It's the **right ingredients** but in the **wrong order**. In a proper sandwich the cheese is adjacent to the bread to create a moisture barrier against the lettuce. They might as well have dragged this thing through a car wash.*

Leonard : *I don't believe it.*

Sheldon : *I know, it's **basic culinary science.***



[Series 1 Episode 14 - The Nerdvana Annihilation]