

Projekt SYMMETRI: Forslag i oversigtsform

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(Tapet-)mønstre og Euklidiske krystallografiske grupper

- Uendelige symmetrigrupper for plan og rum
- Hvad er symmetrigruppen for et mønster?
- Hvilke slags symmetrier findes der? Hvordan dannes de undergrupper af symmetrigruppen?
- Punktgrupper, gitter, virkninger.
- Hvilke typer symmetrigrupper findes der (for friser, plane mønstre, 3d mønstre – krystaller)?

Litteratur:

- Morandi, Symmetry groups: The Classification of Wallpaper Patterns.
<http://sierra.nmsu.edu/morandi/OldWebPages/Math526Spring2007/Math526text2007-01-10.pdf>.
- Armstrong, Groups and Symmetry, Springer 1988.
- Schattschneider, The Plane Symmetry Groups: Their Recognition and Notation. American Monthly 1978.
- Farris, Creating Symmetry: The Artful Mathematics of Wallpaper Patterns, Princeton University Press, 2015
- Baker, Groups and Symmetry, 2005
<http://www.maths.gla.ac.uk/~ajb>
- Geometrical symmetry and the fine structure of regular polyhedra, Bill Casselman (Generelt om symmetri, herunder tapetgrupper)

<https://www.math.ubc.ca/~cass/symmetry.pdf>
- Polyhedral Modularity in a Special Class of Decagram Based Interlocking Star Polygons, Reza Sarhangi (Symmetri og kvasisymmetri i persiske mønstre).

http://archive.bridgesmathart.org/2012/bridges2012-165-feb1_2016.pdf

Symmetri af viruscapsider

- Endelige undergrupper af $SO(2)$
- Symmetri af polyedre
- De platoniske legemer
- Viruscapsider og deres symmetri
- Endelige undergrupper af $SO(3)$
- Fliselægning på overfladen af et ikosaeder.

Litteratur

- M.A. Armstrong, Groups and Symmetry, Springer 1988.
- Klassifikation af de endelige undergrupper af $SO(3)$
[https://groupprops.subwiki.org/wiki/Classification_of_finite_subgroups_of_SO\(3,R\)](https://groupprops.subwiki.org/wiki/Classification_of_finite_subgroups_of_SO(3,R))
- R. Twarock, LMS Popular Lecture (Symmetri og vira)
<https://www.youtube.com/watch?v=dsJCv1DOfTo>
LMS Popular Lecture
- <https://www.lms.ac.uk/sites/lms.ac.uk/files/5.Twarock-VirusesandGeometry.pdf> R. Twarock - Viruses and Geometry. Mange andre aspekter end ikosaedersymmetrien.
- H. Mark, Classifying Finite Subgroups of $SO(3)$.
<http://homepages.math.uic.edu/~kauffman/FiniteRot.pdf>
- Y. Kosmann-Schwarzbach, Groups and Symmetries: From finite groups to Lie groups, Springer 2010.

Rubiks terning

- Algebraen af 15-puzzlespillet: en invariant afgør om en konfiguration kan løses.
- Elementære drejninger i terningen – og hele Rubikgruppen
- Cykliske grupper, alternerende og permutations (under-)grupper
- Identifikation af symmetrigruppen for terningen og dens orden
- Hvor mange elementære drejninger skal man højst bruge ("God's number")?
- Identifikation af gruppens center

Litteratur:

- Frey, Singmaster. Handbook of Cubik Math. Lutterworth Press, 2010.
- Joyner, Adventures in group theory: Rubik's Cube, Merlin's machine and other mathematical toys. Johns Hopkins Univ. Press, 2002.
- Chen, Group Theory and the Rubik's Cube, Web
- Mackenzie, Mathematicians do the twist, in: What's new in the mathematical sciences 9, AMS 2009.
- Colmez, Le rubik's cube, groupe de poche, Culture MATH, ENS, 2010.

Flere referencer

<http://people.math.aau.dk/~raussen/PROJECT/2016/web.pdf>