Seminar on Floer homology, Part II

Winter term 2025/26

Prof. Bernd Ammann

Thursday, 14-16, M009

Number of sessions: **15**

Available Dates: 16.10. (SFB retreat in Windberg), 23.10., 30.10., 6.11., 13.11., 20.11., 27.11., 4.12., 11.12., 18.12., 8.1., 15.1., 22.1., 29.1., 5.2.

Special obstruction:

- Oct 16, SFB retreat to Windberg

Talk no. 1: Summary of where we are. *16.10.* **(SFB retreat in Windberg)** N.N..
DETAILS STILL MISSING

Supplementary Talk no. 1: More on J-holomorphic curves. Energy identity, unique continuation, critical points, somewhere injective curves, adjunction inequality [MS04, Sections 2.2 to 2.6]

Talk no. 2: Transversality and exponential convergence. *23.10.* N.N..
Discuss [Sal99, Sections 2.6 and 2.7]. Additional literature: [MS04, Chapter 3, in particular Section 3.2].

Talk no. 3: Definition of the Floer complex. *30.10.* N.N..
Discuss compactness of the moduli space modulo bubbling. Then we have the necessary ingredients to define Floer homology. [Sal99, Sections 3.1 and 3.2]. Explain Floer's Theorems [Sal99, Theorems 3.5–3.7] without proofs.

Talk no. 4: Floer's gluing theorem. *6.11.* N.N..
Prove Floer's gluing theorem and use it to prove Theorem 3.5 [Sal99, Section 3.3].

Talk no. 5: Invariance of Floer homology. *13.11.* N.N..
Present [Sal99, Sections 3.4 and 3.5]. These results provide proofs of Theorems 3.6 and 3.7 and finally the Arnold conjecture.

Supplementary Talk no. 2: Outlook. *20.11.* N.N..
THIS TALK AND THE FOLLOWING ARE NOT WORKED OUT SO FAR!!! Depending on how fast we will have advanced so far, we will have some outlook now. Natural contents of this talk could be the remaining parts of [Sal99, chapter 3], connections to Gromov-Witten invariants and quantum cohomology [MS94] or holomorphic curves in symplectic manifolds of low dimensions [Wen18].

Seminar-Homepage:

https://ammann.app.uni-regensburg.de/floer2/

Literatur

[MS94] Dusa McDuff and Dietmar Salamon. *J-holomorphic curves and quantum cohomology*, volume 6 of *University Lecture Series*. American Mathematical Society, Providence, RI, 1994.

[MS04] Dusa McDuff and Dietmar Salamon. *J-holomorphic curves and symplectic topology*, volume 52 of *American Mathematical Society Colloquium Publications*. American Mathematical Society, Providence, RI, 2004.

[Sal99] Dietmar Salamon. Lectures on Floer homology. In *Symplectic geometry and topology (Park City, UT, 1997)*, volume 7 of *IAS/Park City Math. Ser.*, pages 143–229. Amer. Math. Soc., Providence, RI, 1999. available here.

[Wen18] Chris Wendl. *Holomorphic curves in low dimensions*, volume 2216 of *Lecture Notes in Mathematics*. Springer, Cham, 2018. From symplectic ruled surfaces to planar contact manifolds.