

Hambleton: Cyclic group actions on contractible 4-manifolds

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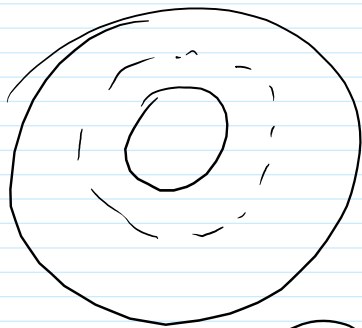
$W^4$ : compact contractible  $\partial W^4$  is a  $\mathbb{Z}$ -homology sphere.

$$\Sigma(a_1, a_2, a_3) = \{(z_1, z_2, z_3) \in \mathbb{C}^3 : z_1^{a_1} + z_2^{a_2} + z_3^{a_3} = 0\} \cap S^5$$

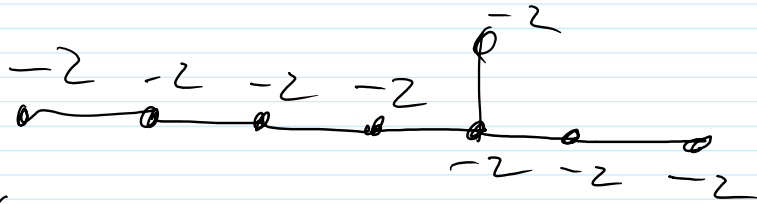
Sifert fibred space  $S^1 \hookrightarrow \Sigma(a_1, a_2, a_3) \hookrightarrow W^4$   
 3 exceptional fibers.

$p$  prime,  $p \nmid a_1, a_2, a_3$  then  $\mathbb{Z}/p$  acts freely on  $\Sigma(a_1, a_2, a_3)$

Plumbing description:



oriented  $D^2$  bundle over  $S^2$



$$\Sigma(2, 3, 5) = \partial M(E_8)$$

Poincaré homology sphere.

"Mikhael mfd"

Q. Given a  $\mathbb{Z}$ -homology sphere  $\Sigma^3$ , does it bound a smooth 4-manifold  $W^4$ ?