The paper under review deals with the interplay of the moduli of curves and the moduli of $K3$ surfaces via the virtual class of the moduli spaces of stable maps. Using Getzler’s relation for $\overline{M}_{1,4}$ [E. Getzler, J. Am. Math. Soc. 10, No. 4, 973–998 (1997; Zbl 0909.14002)], the authors construct a universal decomposition of the diagonal in Chow in the third fiber product of the universal $K3$ surface. This decomposition together with the Witten-Dijkgraaf-Verlinde-Verlinde relation in genus 0 is used to prove a conjecture of Marian-Oprea-Pandharipande [A. Marian et al., Ann. Sci. Éc. Norm. Supér. (4) 50, No. 1, 239–267 (2017; Zbl 1453.14016)]: the full tautological ring of the moduli space of $K3$ surfaces is generated in Chow by the classes of the Noether-Lefschetz loci. Furthermore the authors propose a connection between relations in the tautological ring of the moduli spaces of curves and relations in the tautological ring of the moduli space of $K3$ surfaces.

Reviewer: Mauro Fortuna (Hannover)

MSC:
14J28 $K3$ surfaces and Enriques surfaces
14J10 Families, moduli, classification: algebraic theory
14C15 (Equivariant) Chow groups and rings; motives
14D07 Variation of Hodge structures (algebrao-geometric aspects)
14N35 Gromov-Witten invariants, quantum cohomology, Gopakumar-Vafa invariants, Donaldson-Thomas invariants (algebrao-geometric aspects)

Keywords:
$K3$ surfaces; moduli spaces; tautological cycles; Noether-Lefschetz loci; Gromov-Witten theory

Full Text: [DOI]

References:
[9] Yau, S.

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