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**Linhui Shen** and **Daping Weng\*** ([wengdap1@msu.edu](mailto:wengdap1@msu.edu)), 619 Red Cedar Rd, C331, East Lansing, MI 48824. *Cluster Structures on Double Bott-Samelson Cells.*

We introduce double Bott-Samelson cells for any Kac-Peterson group  $G$  and a pair of positive braids  $b$  and  $d$  as a moduli space of flags satisfying certain relative position conditions. Double Bott-Samelson cells are natural generalizations of double Bruhat-Cells introduced by Fomin and Zelevinsky. We prove that the coordinate rings of double Bott-Samelson cells are upper cluster algebras. We also construct the cluster Donaldson-Thomas transformation on double Bott-Samelson cells and prove the Fock-Goncharov cluster duality for the corresponding cluster ensembles. As an application, we obtain a new geometric proof of Zamolodchikov's periodicity conjecture in the cases of  $D \otimes A_n$  and a link invariant for closures of positive braids. This is joint work with Linhui Shen. (Received August 28, 2019)