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$\mathbf{Z}_Q$ topological invariants for identification of short rangeentangled states ISAO MARUYAMA, Osaka University, SHO TANAYA, YASUHIRO HATSUGAI, Tsukuba University — Since the Berry phase is quantized as Z_2 value, i.e., 0 or π, due to the time-reversal, or lattice-inversion symmetry in any dimension, the quantized Berry phase[1] is useful for characterization of a topological or quantum order in various models including strongly correlated electron systems[2] and spin systems[3]. Recently, we have proved Z_Q quantization of Berry phases for the general lattice symmetry, where Z_Q ($Q = d + 1$) Berry phases are defined for d-dimensional lattices: Polyacetylene, Kagome and Pyrochlore lattice respectively for $d = 1, 2$ and 3.[4]. We have also characterized the dimer-plaquette transition of the orthogonal dimer model in two dimension[5]. [1]Y.Hatsugai, J. Phys. Soc. Jpn, **75**, 123601 (2006). [2]IM, Y. Hatsugai , J. Phys. Soc. Jpn, **76**, 113601 (2007). [3]IM, T.Hirano, Y.Hatsugai, Phys. Rev. B. **79**, 115107 (2009)[4]Y.Hatsugai, IM, Euro. Phys. Lett., **95**, 20003 (2011) [5] I.Maruyama, S.Tanaya, M.Arikawa, Y.Hatsugai, J. Phys.:Conf. Ser., **320**, 01219 (2011)

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