New topological types of Majorana modes at ends of one-dimensional topological superconductors YUXIN ZHAO, ZIDAN WANG, The University of Hong Kong — As being known, topological insulators/superconductors are completely classified into various topological types with respect to their anti-unitary symmetries and dimensions, and for a certian dimension different topological types correspond to different boundary gapless modes, which is quantitatively described as a general index theorem. Based on this and Kitaev's model in class D, we construct models for all the other types of D1 topological superconductors and analyze their topologically protected Majorana zero-modes at ends. We highlight that: 1)The two kinds of $\mathbf{Z_2}$ topological numbers imply distinct forms of Majorana zero-modes. 2) The two-fold degenerate ground state of the DIII model with Majorana fermions can be effectively regarded as a spin when the model is coupled to a weak external magnetic field. 3)The BDI model with $\mathbf{Z}$-type unit topological number can be assigned topological charges ± 1 to its Majorana zero-modes at two ends in agreement with the general index theorem. 4)The CII model with $\mathbf{Z}$-type topological number 2 may be regarded as two copies of the BDI model with certain spin-pairing patterns, and consistently the topological charge of its Majorana zero-modes is defined in the same sense of that of the BDI model.

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