The thermal vacuum for non-equilibrium steady state RYOSUKE
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Waseda Univ — Our purpose is to construct a theoretical description of non-
equilibrium steady state (NESS), employing thermo field dynamics (TFD). TFD
is the operator-based formalism of thermal quautum field theory, where every de-
gree of freedom is doubled and thermal averages are given by expectation values of
the thermal vacuum[1]. To specify the thermal vacuum for NESS is a non-trivial issue,
and we attempt it on the analogy between the superoperator formalism and TFD[2].
Using the thermal vacuum thus obtained, we analyze the NESS which is realized
in the two-reservoir model. It will be shown that the NESS vacuum of the model
coincides with the fixed point solutions of the quantum transport equation derived
by the self-consistent renormalization of the self-energy in non-equilibrium TFD [3] .

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