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SOME NEW MODELS AND THEIR SOLUTIONS FOR INTENSIVE STEEL QUENCHING

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The conventional steel quenching is usually performed in environmentally unfriendly oil or water/polymer solutions. Contrary to traditional method the intensive quenching process uses environmentally friendly highly agitated water or low concentration of water/mineral salt solutions [1] - [3]. Traditionally for the mathematical description of the intensive quenching process, classical heat conduction equation is used. We propose in the year 2005 to use hyperbolic heat equation for more realistic description of the intensive quenching (IQ) process (especially for process initial stage). However, the utilization of this hyperbolic type partial differential equation brings serious difficulty. It is practically impossible to determine experimentally the initial heat fluxes. In our previous papers we have constructed various one and two dimensional analytical exact and approximate [4], [5] solutions for IQ processes. Here we consider few other models and construct solutions for direct and inverse problems of hyperbolic heat conduction equation. Here are both approximate (on the basis of conservative averaging method), and exact (on the basis of Green function method). We obtain the solution for initial heat flux in the form of the iterated integral equation.

References

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