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Section 1: Computer simulation

Interpretation of hearth state in blast furnaces based on wear model calculations

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The results of a model estimating the inner profiles of erosion and buildup material of the hearth region of ironmaking blast furnaces are presented. The model is based on the geometry and thermal properties of the hearth lining material, as well as thermocouple information from the lining. Inverse static heat transfer problems for two-dimensional slices of the hearth lining are solved to provide a three-dimensional estimate of the inner profile. Special attention is paid to the robustness of the solution, yielding a generic model optimized for fast computation, which makes it possible to analyze the furnace hearth conditions over whole campaigns. The results of the model are illustrated for several different blast furnaces, and some conclusions concerning its potential for shedding light of the blast furnace hearth state are presented. The possibility to utilize the reconstructed inner profiles for force balance-based estimation of the floating state of the dead man is also discussed.