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11. Mathematical Physics

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Cylindrical and spherical problems of Stefan: analytical solutions and numerical estimates

Two-phase physical systems with mobile interfaces lead to cylindrical [1] and spherical [2] parabolic problems analogous to the classical problem of Stefan. In the cylindrical case [3] the nonsingular solution within the phase with energy sources is found as a series in the Laguerre polynomials, and within the second phase - in terms of new special functions related to the exponential integrals. The latter are studied in detail both analytically and numerically, and the deviation of the interphase radius time dependence from the classical $\sqrt{t}$ is determined.
In the spherical case [3] both solutions are expresed in terms of the incomplete Γ-function; if the cources power is constant the interface radius is shown to be proportional to $t^{1/3}$, other cases are considered.

References [1] A. W. DeSilva, J. D. Katsouros, *Proc. Int. Conf. Strongly Coupled Coulo, b Systems, Boston, 1997* (to be published, 1998).
[2] H. E. DeWitt, W. L. Slattery, *ibid.*
[3] P. Fernández de Córdoba, I. M. Tkachenko, *Thermodynamic and kinetic parameters of discharge plasmas*, Publ. Service, Universidad Politécnica de Valencia, 1995. (in Spanish).