

Title (en)

METHOD AND DEVICE FOR THE ELECTROMAGNETIC STIRRING OF ELECTRICALLY CONDUCTIVE FLUIDS

Title (de)

VERFAHREN UND EINRICHTUNG ZUM ELEKTROMAGNETISCHEN RÜHREN VON ELEKTRISCH LEITENDEN FLÜSSIGKEITEN

Title (fr)

PROCÉDÉ ET MODULE D'AGITATION ÉLECTROMAGNÉTIQUE DE LIQUIDES ÉLECTRIQUEMENT CONDUCTEURS

Publication

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Application

EP 08801098 A 20080801

Priority

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Abstract (en)

[origin: WO2009018809A1] The invention relates to a method and to a device for the electromagnetic stirring of electrically conductive fluids (2, 21, 22) in the liquid state and/or in the state of onsetting solidification of the fluid (2, 21, 22), using a rotating magnetic field that is produced in the horizontal plane of a Lorentz force (FL). The aim is to achieve an intensive three-dimensional flow on the inside of the fluid for mixing in the liquid state up to the direct vicinity of solidifying fronts, and to simultaneously ensure an undisturbed, free surface of the fluid. The solution is to change the direction of rotation (15, 16) of the magnetic field rotating in the horizontal plane at regular time intervals in the form of a period duration (TP), wherein the frequency of the directional change of movement of the magnetic field vector is adjusted such that in the state of mixing the liquid fluid (2, 21, 22) a period duration (TP) is adjusted between two directional changes of the magnetic field during a time interval (?TPM) as a function of the adjustment time (ti.a.) with the condition (I) $0.5 \cdot ti.a \leq PM \leq 1 \cdot ti.a$ and such that, at the beginning of the state of onsetting solidification of the fluid (2, 21, 22), a period duration (Tp) is set between two directional changes of the magnetic field in a time interval (?TPE) as a function of the adjustment time (ti.a.) with the condition (II) $0.8 \cdot ti.a \leq PE \leq 1 \cdot ti.a$, wherein the adjustment time (ti.a) is specified by the equation (III) in which after an activation of the rotating magnetic field in a fluid (2; 21, 22) in the resting state the double vortex of the meridional secondary flow (18) forms, and in which s is defined as the electric conductivity, ρ as the density of the fluid (2, 21, 22), ω as the frequency, Bo as the amplitude of the magnetic field, and C9 as the constant for the influence of the size and shape of the volume of the fluid (2, 21, 22).

IPC 8 full level

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