**Exact Control of a System of Diffusion Equations**
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**Abstract:** It is shown how a vector control function $f(x,t)=(f_i(x,t))$ can be found that will drive the solution of the linear diffusion system

$$\begin{aligned}
\frac{\partial u_1}{\partial t} &= \alpha_1^2 \frac{\partial^2 u_1}{\partial x^2} + a_{11}u_1 + a_{12}u_2 + \cdots + a_{1n}u_n + b_1 f_1(x,t) \\
\frac{\partial u_2}{\partial t} &= \alpha_2^2 \frac{\partial^2 u_2}{\partial x^2} + a_{21}u_1 + a_{22}u_2 + \cdots + a_{2n}u_n + b_2 f_2(x,t) \\
&\vdots \qquad\qquad\qquad\qquad \vdots \\
\frac{\partial u_n}{\partial t} &= \alpha_n^2 \frac{\partial^2 u_n}{\partial x^2} + a_{n1}u_1 + a_{n2}u_2 + \cdots + a_{nn}u_n + b_1 f_n(x,t)
\end{aligned}$$

from an arbitrary initial condition $u(x,0)=\phi(x)=(\phi_i(x)),\ i=1,2,...,n$ to an arbitrary final condition $u(x,T)=\psi(x)=(\psi_i(x)), i=1,2,...,n$ in arbitrary time $T$.