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Remark on the rate of decay of solutions to linearized compressible Navier-Stokes equations.

(English) Zbl 1060.35104
Pac. J. Math. 207, No. 1, 199-234 (2002).

The following Cauchy problem is considered:

$$\begin{aligned} &\frac{\partial \rho}{\partial t} + \gamma \operatorname{div} v = 0 \quad \text{in } (0,\infty)\times\mathbb{R}^n \\ &\frac{\partial v}{\partial t} - \alpha\Delta v - \beta\nabla\operatorname{div} v + \gamma\nabla\rho = 0 \quad \text{in } (0,\infty)\times\mathbb{R}^n \\ &v(x,0) = v_0(x), \quad \rho(x,0) = \rho_0(x) \quad \text{in } \mathbb{R}^n \end{aligned}$$

Here the velocity $v(x,t)$ and the density $\rho(x,t)$ are unknown functions, $n \geq 2$. The norms
$\|D_t^j D_x^\mu \rho(\cdot,t)\|_{L_\infty(\mathbb{R}^n)}$, $\|D_t^j D_x^\mu v(\cdot,t)\|_{L_\infty(\mathbb{R}^n)}$, $\|D_t^j D_x^\mu \rho(\cdot,t)\|_{L_1(\mathbb{R}^n)}$,
$\|D_t^j D_x^\mu v(\cdot,t)\|_{L_1(\mathbb{R}^n)}$ are estimated via power decreasing time dependent functions multiplied by L_1 or L_∞ norms of initial data ρ_0 and v_0. Estimates are obtained by using the Fourier transform method. The estimates of the paper are better than in *D. Hoff* and *K. Zumbrun* [Z. Angew. Math. Phys. 48, 517–614 (1997; Zbl 0882.76074)] and *Y. Shibata* [Math. Meth. Appl. Sci. 23, 203–226 (2000; Zbl 0947.35020)] .

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MSC:

35Q30 Navier-Stokes equations
76N10 Existence, uniqueness, and regularity theory for compressible fluids and gas dynamics

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linearized compressible Navier-Stokes system; Cauchy problem; decay estimates

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