The following $d$-dimensional Burgers equation is studied:
\begin{equation}
 u_t + (u \cdot \nabla) u = \nu \Delta u + f(x, t),
\end{equation}
where $u(x, t)$ is a $d$-dimensional velocity field, $\nu$ is the viscosity and $f(x, t) = -\nabla F(x, t)$ is a potential random forcing. The random potential $F(x, t)$ is spatially periodic, smooth and is of the form:
\begin{equation}
 F(x, t) = \sum_{i=1}^{N} F_i(x) \dot{W}_i(t).
\end{equation}
Here $F_i(x)$ are non-random $C^\infty$-smooth $\mathbb{Z}^d$-periodic potentials and $\dot{W}_i(t)$ are independent white noises. The convergence of stationary distributions for the Burgers equation and for the Hamilton-Jacobi equations in the limit when viscosity tends to zero are established. The authors' approach is based on the stochastic version of the Lax formula for solutions to the original and limit value problems for the viscous Hamilton-Jacobi equation.

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References

9. Ya. G. Sinai, *Two results concerning asymptotic behavior of solutions of the Burg-