1065-35-68 **Juergen Batt** (batt@mathematik.uni-muenchen.de), Munich, Germany, and **Yi Li*** (yi-li@uiowa.edu), Iowa City. *Steady-States of the Vlasov-Poisson System.*

We will present our study of the **positive** solutions $\phi = \phi(r)$ of the differential equation

$$\phi'' + \frac{2}{r}\phi' = -\frac{r^{\lambda-2}}{(1+r^2)^{\lambda/2}}\phi^p, \qquad p > 1,\ \lambda > 0.$$

In particular, the structure of singular solutions. For $\lambda = 2$, these solutions are the radial solutions of the semilinear elliptic equation

$$\Delta\phi = -\frac{1}{1+|x|^2}\phi^p,$$

on $\mathbb{R}^3$, which T. Matukuma proposed in 1935 for the description of certain stellar globular clusters in a steady state. They correspond to time-independent solutions of the Vlasov-Poisson system

$$\text{(V)} \qquad \partial_t f + v\partial_x f - \partial_x U(t,x)\,\partial_v f = 0$$

$$\text{(P)} \qquad \Delta U(t,x) = 4\pi\rho(t,x)$$

$$\text{(D)} \qquad \rho(t,x) := \int f(t,x,v)\ dv, \qquad x, v \in \mathbb{R}^3,$$

in the case of spherical symmetry; here $f = f(t,x,v) \geq 0$ is the distribution function of the considered system of gravitating mass in the space-velocity space $\mathbb{R}^3 \times \mathbb{R}^3$, $U =$ the Newtonian potential and ρ the local density. (Received August 28, 2010)