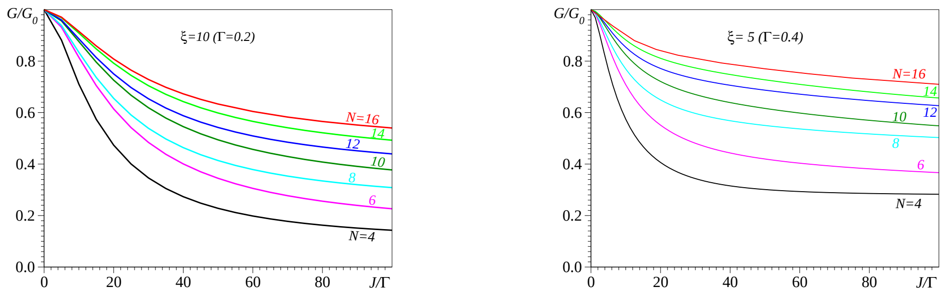

FIG. 3: Conductance G in units of quantum conductance $G_0 = e^2/h$ plotted versus contact interaction J at resonance $\alpha = \varepsilon_F$ for $\xi = 10$ and $\xi = 5$ computed using extended molecules with $N = 4, 6, 8, 10, 12, 14, 16$ sites (values increase upwards).

energies $\boldsymbol{\Sigma}_{\boldsymbol{x}}$ instead of $\boldsymbol{\Sigma}_{\mathbf{0},\boldsymbol{x}}$, by devising certain diagrammatic approximations. We shall not pursue this line here, because as noted in Sect. II, the validity of such approximations is usually not transparent physically. We present instead a simple renormalization scheme, which turns out to work surprisingly well for the IRLM.

Inspired by the rather general framework of the Landau Fermi liquid theory [54], we shall simply suppose that the aforementioned renormalization can be accounted for by means of a multiplicative ε-independent factor F, $\boldsymbol{G}^{\boldsymbol{r}}(\varepsilon)|_{exact} \simeq F\boldsymbol{G}^{\boldsymbol{r}}(\varepsilon)$. Then, the problem is to deduce this factor. For the IRLM at resonance, this can be done, because, as already noted in Sect. V A, the exact conductance is known, $G|_{\alpha=\varepsilon_F} = G_0$. This condition determines the needed factor at resonance for given values of N, ξ and J (remember that we keep $\beta = 1$), but F could dependent on α. Because $G = G(\alpha)$ reaches its maximum at $\alpha = \varepsilon_F$ one can admit that, at least not too far away from resonance, F only slightly depends on α and neglect this dependence altogether.

We have computed and examined the curves of $G = G(\alpha)$ obtained within this renormalization procedure. The results are very encouraging. The renormalized curves are much less size-dependent than the unrenormalized ones. The smaller the values of ξ and J, the weaker is the dependence on N. For illustration, we present in Fig. 4 for comparison the renormalized curves along with those unrenormalized in the rather unrealistic situation of very large values of $J = 10$ and $\xi = 10$, which corresponds to a very large ratio $J/\Gamma = 50$. The fact that, with increasing N, the renormalized curves tend to become size-independent much faster than the unrenormalized curves is clearly visible even in this less favorable case.